

MODERN Machine Shop

HOWARD CAMPBELL, Editor

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JULY, 1935

Number 2

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MODERN Machine Shop

CINCINNATI, OHIO

VOL. 8, No. 2

JULY, 1935

German Locomotive Repair Methods and Tools

BY RENE W. P. LEONHARDT

Consulting Engineer, Berlin, Germany

THE German State Railways Testing Station at Gottingen has for years been developing methods

for the more economic construction and repair of locomotives, the most recent of which apply to the machining of journal box pedestals. The starting-point in this particular case was the recognition of the fact that inferior machining of the pedestals, which is usually a result of the taking of inaccurate measurements, is responsible for undue wear and tear on the equipment and extra consumption of fuel.

The taking of measurements as previously carried out was not only inaccurate but, due to the methods used, consumed a great deal of time. In view of this fact, the testing station engineers have designed a special ma-

chine which combines in itself the processes of measurement and machining, and thus excludes to a great

extent the sources of error. The machine is equally adaptable for original construction or repair work, being primarily intended to make possible the machining of the longitudinal and transverse faces of the fixed journal box guides and wedges so that they are parallel to one another and also so

that they will lie at right angles and at the correct intervals.

In order to eliminate further sources of error due to faulty machining of the journal boxes and of the journals themselves, the journal bearings are also bored after assembly. Only by such means is it possible to construct a journal-box

IN this article the author describes some of the more elaborate tools in use in the shops of the German State Railways at Gottingen.



Fig. 1—This machine is used to align the locomotive frame parts and then machine them to perfect alignment with each other. At the right is one of the carriages. The measuring head with its telescope can be seen on the top of the carriage. The base of transverse measurement is the axis of the cylinder. Crossed hairs in the telescope aid in locating the "zero point" on the axis.

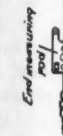
accurately to present-day specifications and to avoid expensive and slow fitting operations which, in the long run, do not prove satisfactory. Experience has shown that it is extremely difficult to mount cylinders with their axes parallel to each other and to the axis of the pedestal, and further, parallel setting is lost after the locomotive has been put into service.

The machine proper consists of two machine beds, 46 feet long, mounted on adjustable wedges on either side of the pedestal, upon which are mounted two carriages, one of which can be seen in Fig. 1. Each carriage consists of a heavy column carrying a cross slide, upon which is mounted a head carrying two grinding wheel spindles for grinding the transverse journal-box guide faces, a grinding spindle and wheel for grinding the longitudinal journal-box guide faces, and a spindle for carrying a tool to drill the journal bearings or for preliminary milling of the journal-box guides, as the case may be. A measuring head also moves on the horizontal slide, but it should be noted that the measuring head is in no way

dependent upon, or affected by, any part of the machine that is subject to wear.

In order to align the pedestal properly, it is mounted on supports as shown in Fig. 2. The supports are built strong enough to carry the entire weight of the pedestal and boiler although it is immaterial whether the pedestal is mounted with or without the boiler when the measurements are taken.

A device has been built into the machine by which the position of the cylinder axes in relation to the pedestal axis is corrected, so that during original construction the tiresome fitting of cylinders is eliminated and during repairs the cylinders can always be brought into a position exactly parallel to the pedestal axis. A machine of this description has already been in use for two years in the German State Railways Repair Shop at Brandenburg, and has produced excellent results. The machine combines in itself the operations of measuring and machining. The journal-box pedestal having once been correctly placed in position on the machine, all journal-box guide faces



Journal bearing machine angles to the pedestal, in case of the accurate measurement of the pedestal

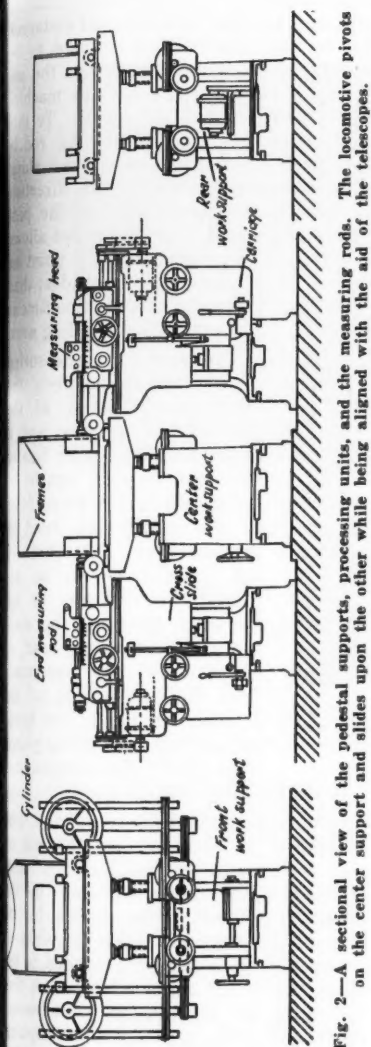


Fig. 2—A sectional view of the pedestal supports, processing units, and the measuring rods, on the center support and slides upon the other while being aligned with the aid of the telescopes.

a comparatively small amount of labor.

The other measuring and machining parts are so interlocked in their functions that both machining and measuring operations can be carried out in rapid sequence, and to a large extent simultaneously. The measurements are made by the use of optical instruments which are accurate to within $1/10$ mm., instead of with the usual rules and scales, centering-wires, and T-squares. The faces of the journal-box guides and the wedges, as well as the journal bearings, are machined in the assembled condition, thus reducing the opportunity for error.

In addition to the above-mentioned work, the machine makes possible a correction of the cylinder axis whereby the expensive hit-and-miss method of mounting the cylinders, as well as inaccuracies in the fit of the cylinders, are eliminated. All work is completed without a working-pit, pedestal repair work being usually done in a department set aside for this purpose. The measuring and machining of the journal-box guides in a triple-coupled locomotive require about eight working hours, as against about 120 working hours when ordinary methods are used.

As already mentioned, the pedestal must be accurately positioned in relation to the machine bed in order to ensure that it will automatically and accurately be machined without need for further measuring. For this purpose two aligning telescopes are provided, mounted on special supports on both sides of the pedestal, with their axes parallel to the machine bed. Further, two auxiliary telescopes are mounted in the axes of the cylinders, as shown in Fig. 3. The axes of the telescopes are aligned by a slight rotation of the pedestal, or, if the cylinders are not correctly positioned, the cylinder axis is adjusted to the pedestal. When this has been

journal bearings, and cylinder boxes are machined in parallel and at right angles to the longitudinal axis of the pedestal, in a single operation. The use of the machine enables the most accurate measurement and machining of the pedestal to be carried out with

done, the pedestal is correctly adjusted on the machine-bed.

The pedestal clamping device for the correct adjustment of the tool carriages includes an optical and measuring rod, which is placed in contact with the packing surface of the cylinder, thus making this the starting-point for taking the measurements. Any necessary correction for unequal distance between the cen-



Fig. 3—Close view of the front clamping support and the cylinder spider with its telescope. All measurements and angles are taken from the axis of the cylinder.

ter of the cylinder and the packing surfaces can be made. The extent of the longitudinal movement of the carriage up to the axis of the driving axle, and from there to the plungers, is indicated by an end measuring rod which is placed on the carriage slide ways and contacted with a dial indicator that is attached to the carriage, or it may be read directly from a scale fixed to the side of the machine, using the telescope on the measuring head. In order to facilitate readings, recurring measuring-points can be marked on the scale.

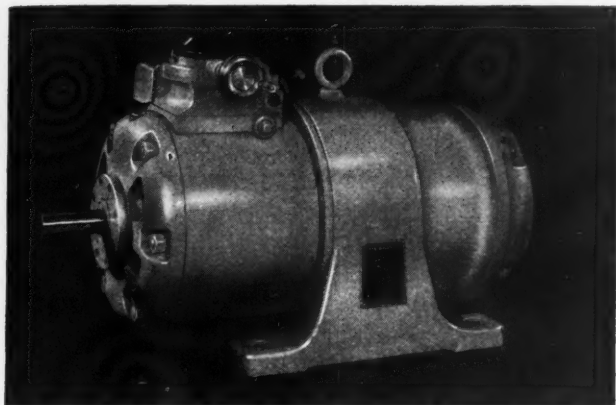
In the event of the center line of the carriage, or of the measuring head, as the case may be, coinciding with the center line of the axle, there

still remain the two unequal distances up to the journal-box guides to be measured in order to obtain the required measurements for the machining of the journal box itself. To this end an optical end measuring rod is supplied which can be moved along the measuring head in the direction of the longitudinal axis of the pedestal. This end measuring rod allows readings to be taken at any point on the journal-box guides; thus it serves at the same time as a check on the grinding work.

The device for measuring the distance between the longitudinal faces of the journal-box guides and a projection or center line of the cylinder axis consists of an auxiliary telescope fitted to the measuring head on the carriage. The axis of the telescope can be adjusted in relation to the aligning telescope by moving the measuring head. A scale on the carriage measures the movement of the measuring head, the fixed measuring face being placed against the longitudinal face of the journal-box guide.

Accurate adjustment of the tool carriages is obtained by the use of the telescopes in conjunction with crossed spider-lines (hairs) in the measuring head. The device for locating the carriage slide consists of an auxiliary telescope attached to the slide, the latter being adjusted so that the axis of the auxiliary telescope coincides with that of the aligning telescope so that an axial and parallel position of the slide is assured.

For correcting the axes of the cylinders, a hollow shaft carrying the wheel and spindle for grinding the cylinder packing surfaces (ends) is mounted on a pivot and can thus be adjusted in any direction. An aux-



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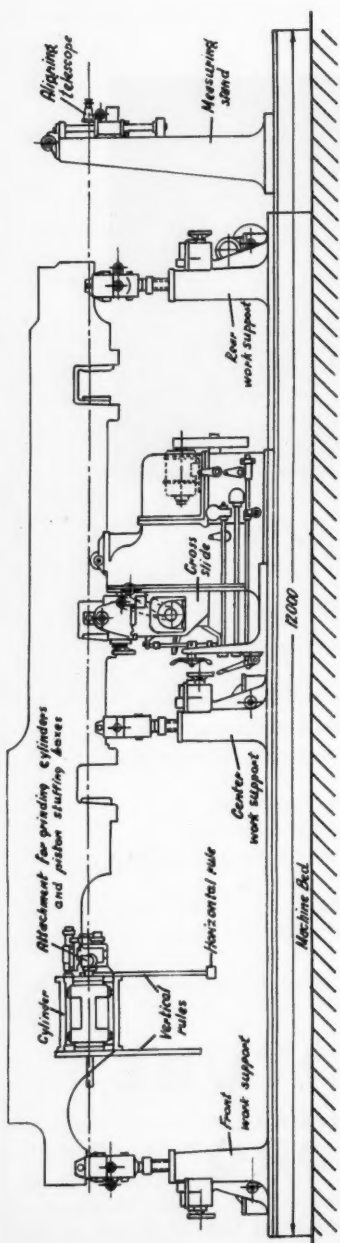
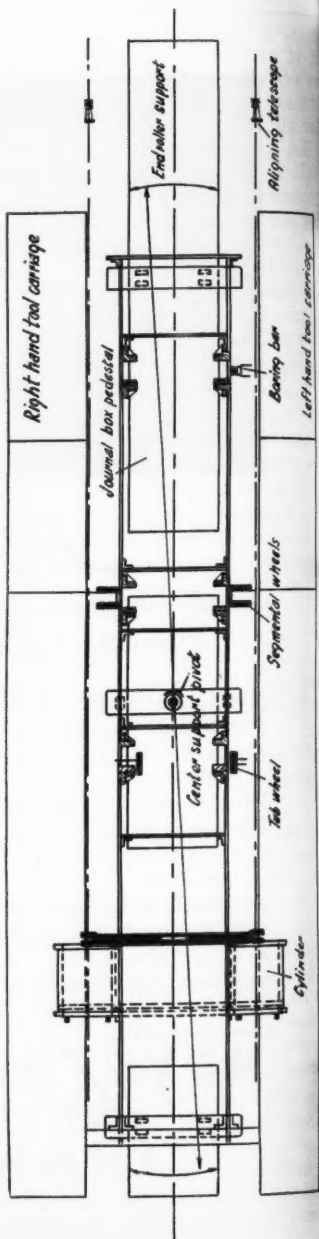


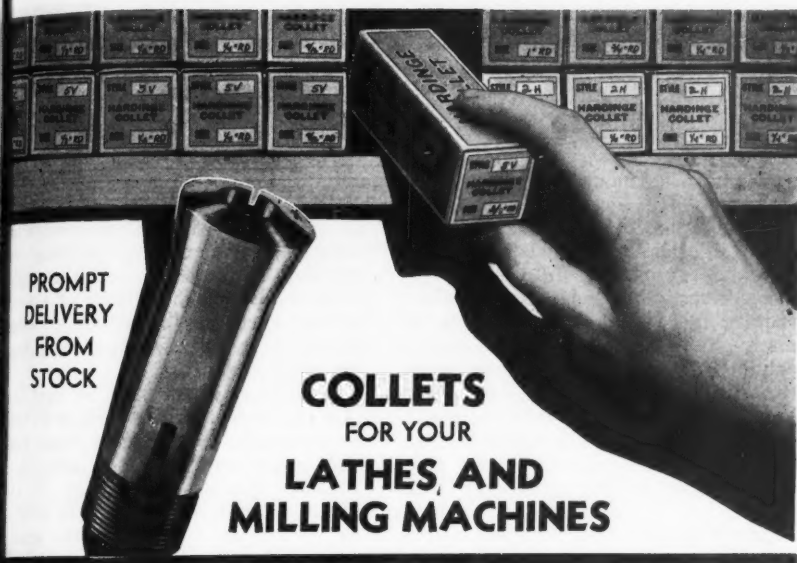
Fig. 4—Side elevation diagram showing the general arrangement of the machine. The frames must be raised to the level of the telescopes on the tool carriages, which are non-adjustable vertically. Horizontally they must be aligned with the telescopes in the cylinders, which are non-adjustable horizontally.



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iliary telescope is mounted in its interior. The auxiliary telescope is used to align the cylinder with the aligning telescope, then the packing surfaces are ground parallel to one another and at right angles to the axis of the pedestal. A cylinder-boring apparatus mounted on the shaft is then used to bore the cylinder.

The device for clamping the pedestal in position consists of two clamping supports. In the case of locomotives, the pedestals of which require more than two supports, as many clamping supports as desired can be used. These supports, which can be shifted on the bed-ways, have cross-ties floating on two vertically-adjustable spindles for horizontal adjustment. One more cross-tie rests across each of the cross-ties mentioned, of which the center or front support, as the case may be, can be swung around a pivot in its center so that its sides rest against rollers. The cross-tie of the other support

rests on rollers only, which are free to move on the periphery of a circle which has as its center the pivot of the center cross-tie. Thus the clamping support allows the pedestal to be adjusted in all directions.

The apparatus for grinding the pedestals consists of a centering device which clamps to the end of the pedestal, a shaft extending through the centering device and carrying the grinding equipment, and the equipment itself, which consists of a small motor carrying a grinding wheel mounted on an arm projecting from the central shaft.

In conclusion it may be said that this equipment, which weighs 56 tons, is naturally more costly than portable equipment. On the other hand, the greatly increased efficiency in construction and repair work is attained by its use as a result of the greatly increased accuracy obtained in the work and the saving in the amount of time required.

HARDINGE COLLET CATALOG No. 35A: Forty-five years of experience are represented in the manufacture of the collets shown in Catalog No. 35A, now being issued by Hardinge Brothers, Inc., Elmira, N. Y. The book shows the styles of collets regularly adapted in the various makes of lathes and milling machines made in the United States, and is claimed to be the most complete list of its kind. The several styles of collets are listed together with the round, hexagon, and square capacities of each, and the general dimensions are given for the benefit of engineering, purchasing, and tool departments. A copy of the catalog is available to any mechanical executive or engineer upon request.

NEW DEPARTURE BALL BEARINGS: DIMENSIONS, LOAD DATA, AND LIST PRICES: This 5½ x 8½-inch book contains 144 pages of descriptions and illustrations of the various types and kinds of bearings made by the New Departure Mfg. Co., Bristol, Conn. In addition to the discussions of Design and Load Characteristics and descriptions of Typical Mountings, tables giving the principal dimensions and radial load ratings are given for each different type.

The list includes Single Row Ball Bearings, Double Row Bearings, "Radial" Bearings, "Difrax" Bearings, Extra Large Bearings, Magneto Bearings, Extra Small Bearings, Clutch Throwout Bearings, Snap Ring Bearings, Shielded Bearings, Conveyor Roll Bearings, N-D-Seal Bearings, Front Wheel Bearings, and Rear Wheel Bearings.

Instructions are given for aid in the selection of bearings, and tables of A. E. Standard Bearing Tolerances and Mounting Fits are included. The latter part of the book is devoted to standards for locknuts and lock washers, felts, washers, and springs, felt seals, and tables of bearing weights.

A copy of the book is available without charge to any mechanical engineer or executive who asks for Booklet No. 1 on his firm letterhead.

Your August copy of MODERN MACHINE SHOP will be your guest to The Machine Tool Show, to be held in Cleveland, September 11-21. It will not be placed in the mails until August 20. Be sure to save it.

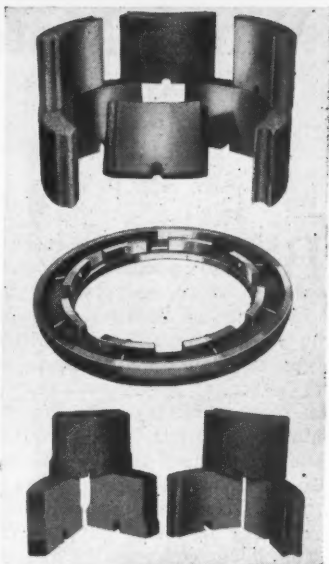
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STERLING  **ABRASIVES**

Hard-Facing Valve Seats At the White Motor Plant

BY FRED B. JACOBS

BECAUSE of the recent widespread adoption of hard-faced exhaust valve seat inserts by manufacturers of heavy duty trucks and buses the indications are that this type of design will soon be standard in passenger cars, Diesel engines, and, in fact, in all types of internal combustion engines. Numerous reports show that hard-faced seats last from 10 to 20 times longer between valve grinds than ordinary cast iron seats, resulting in lower gasoline consumption, lower compression losses and increased power, mileage and all around motor efficiency.

Only during the past few years has much attention been given to the valve seat problem, cast iron seats machined directly into the cylinder block or cylinder head having been standard since the first use of the poppet type valve in automobile engines thirty-five or forty years ago. However, with the development of better engineering materials to fit specific conditions, and more advanced engineering principles, the ordinary cast iron seat has recently given way to a group of specialized materials covering a wide range of hardness and

abrasion resistance. These materials include alloy cast iron, alloy steel, high-speed and Haynes Stellite.

Cast iron seats have always caused more or less trouble especially on heavy duty equipment where they require constant servicing because of burning, pitting and pounding. The fact that modern engines materially increase the duty on the valves and seats as compared with loads of a few years ago has accentuated the problem. Higher compression ratios, faster speeds and more constant running at full load have resulted in shortening the life of the usual cast iron seat to point where its operation is no longer in keeping with the idea of modern engine efficiency.

The exhaust valve seat is subjected to both high temperatures and stresses and at these temperatures the carbon is presumably burned out of the seat forming a deposit of fine, flaky particles on the valve and seat. To this is added the carbon formed by the combustion of the gases in the cylinder. These carbon particles adhere to the valve and seat tend to grind down and wear away the seat and the effect is increased by the natural pounding of the valve on the seat. As the valve seat wears and the valve sinks deeper into the block, the clearance between the valve stem and the tappet is diminished. If this clearance should be completely taken up, a "blow by" of the gases occurs. Not only does the engine lose compression but the valve erodes rapidly. To prevent this from happening, frequent and annoying valve adjustments are necessary. Also, when the valve sticks, the hot burning gas "draws" through the slight opening between the valve and its seat causing rapid erosion.

These facts indicate the use of seating material more resistant to abrasion, corrosion and erosion at high temperatures than the cylinder

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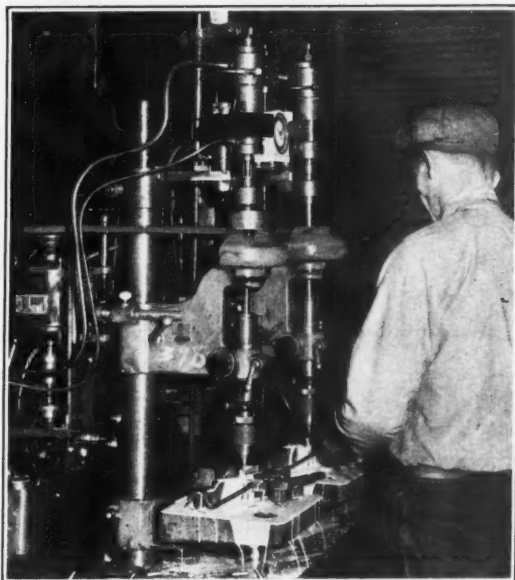
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or head casting. Briefly, the requirements, then, for the seating material are:

1. It should retain its strength and hardness at elevated temperatures.
2. It should resist abrasion, erosion and corrosion.
3. It should be smooth, have a low

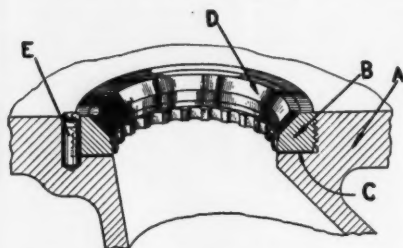


Fig. 1—Construction Details of Hard-Faced Valve Seat.

coefficient of friction, and resist the formation of deposits on its surface.

Additional requirements affecting problems of design are:

4. It should have approximately the same coefficient of expansion as the cylinder block material.
5. It should be easily installed and serviced.

Haynes Stellite, a non-ferrous alloy of cobalt, chromium and tungsten has been found to fit these requirements admirably. Inherently hard, this alloy retains its hardness through the red heat range, and at temperatures above 1100 deg. F., is harder than any other known alloy, except those of the tungsten carbide class. It is one of the most abrasion-resistant materials known to industry and is so smooth and takes such a high polish that it is often used as a burnishing tool. Its coefficient of friction is low, one-third lower than that of steel, and its thermal expansion agrees well with that of steel up to 1290 deg. F. In the form of welding rod, the alloy is easily and quickly applied by the oxy-acetylene blowpipe and

welded deposits are easily ground by means of recently developed precision grinding equipment.

A number of larger truck and bus companies, among which is the White Motor Company, have standardized on Haynes Stellite valve seats and have kept accurate performance records. These companies have found that after runs of 100,000 to 150,000 miles under full load, no regrounding or refinishing of the valve seats is necessary. Even after these long runs the seating surfaces are in as good condition as when installed. Moreover, the alloy steel valves also last longer when working against a Haynes Stellite seating surface. One midwestern fleet owner reports he is now getting 150,000 to 200,000 miles from steel valves that are operating on Stellite seats, whereas formerly the best he could obtain with steel valves on cast iron was about 6,000 miles' service.

There are two usual methods of installing Haynes Stellite valve seats. One consists in holding the insert

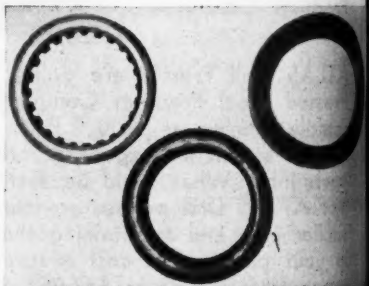
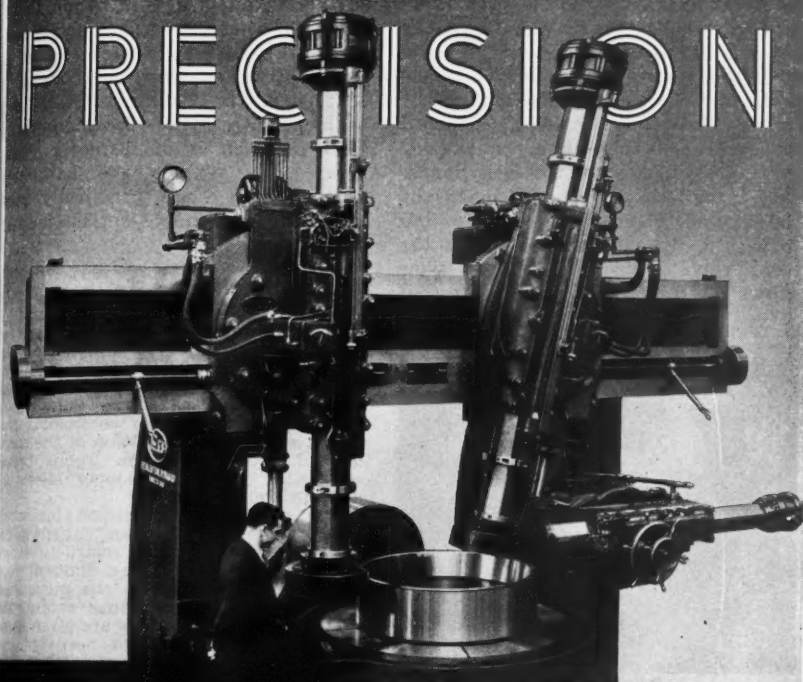


Fig. 2—(a) Valve Seat Insert. (b) Insert with Stellite Seat Welded in Place. (3) Finished Valve Seat.

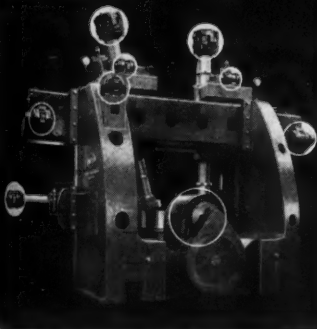
seat in place by means of a shrink or press fit. The second method, which is used at the White Motor plant, is to screw the seat into the counterbore of the block.

The construction details of this seat are clearly shown in the illustration.

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tion Fig. 1, wherein the cylinder block is indicated at A, the steel valve seat at B, the soft metal washer against the seat is screwed in place at C, the Stellite seat welded in place at D, and the locking screw at E.

The seat consists of a threaded machine steel ring having a beveled seating surface upon which is deposited a layer of Stellite by means of the oxy-acetylene process. Referring to Fig. 2, the part at the left is the steel valve insert, the upper view shows the insert with the Stellite seat



Fig. 3—Welder hard-facing a valve seat for a White motor by applying Haynes Stellite.

welded in place, and at the right is shown a finished valve seat.

The welding process is shown in Fig. 3. The valve seat is placed on a rotating holder, the rotating movement being actuated by a fractional horsepower motor driving through a speed reducer. The operator controls the rotation of the valve by means of a foot treadle which operates as a rheostat, speed from practically nothing to approximately 30 revolutions per minute being available. However, the average practical speed is about one revolution of the work in a half-minute.

After the seats have been welded they are rough-ground, threaded on the outside, and screwed into the

block. Then the hard-faced seating surface is finished with a high speed grinding wheel, held so that the seat is of the correct angle, concentric and absolutely square with the valve seat base. The locking screw is used to lock the seat to the counterbore. Once in place, it should never be necessary to remove the hard-faced seats as they are practically indestructible and should outlast the rest of the motor.

ANACONDA WELDING RODS: This sixteen-page book contains a fund of valuable information for every user of welding equipment or supervisor of a department in which welding operations are carried on. The book tells why bronze and other copper alloys have found widespread favor as welding rods and gives a clear description of the methods of procedure when Tobin bronze and other Anaconda copper alloys are used in welding.

The particular application for which each type of rod is best suited is described in detail and instructions are given for the use of the different rods. A chapter is devoted to the preparation and method used in bronze welding and a number of illustrations are given showing the results that have been obtained by the use of such rods.

In a chapter titled "Methods of Welding", detailed instructions are given for handling the Oxy-Acetylene Gas Torch when Tobin bronze, manganese bronze, brazing metal, naval brass, nickel, silver or ambrac are used. Another section discusses the practice to follow with Everdur phosphor bronze E, deoxidized copper and silicon copper. Still another section gives directions for the use of electric carbon arc and metal arc with the same metals.

A copy of this book is available to any mechanical executive upon request.

"CP" POWER VANE ROTARY TOOLS: This sixteen-page catalog contains descriptions, specifications, and illustrations in color of the various units comprising the "CP" power vane rotary drills made by the Chicago Pneumatic Tool Company, 6 E. 44th St., New York, N. Y. Of particular interest is a two-page cross section drawing showing the operating mechanism and construction of a power vane tool. Copies of the catalog are available to mechanical executives upon request.

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Punch Press Operations and Tools, X

Hand-indexed dies have a definite place in the production of stampings. In this article the author discusses the design and construction of these dies.

By C. L. SZALANCZY,
Tool and Equipment Department, Westinghouse Electric & Mfg. Co.

AMONG the more frequent types of work produced by the stamping method is the round blank in which a number of holes or slots are perforated. Hand-indexed dies are used extensively in the production

ing located on either the same or different diameters.

A substantial saving in tool cost may be made by employing this type of tool since otherwise it would mean constructing a large die containing the entire set of punches for piercing all the slots or holes in a single operation. While the latter method is quicker, the original cost of the tool is much higher and if the number of punchings required is limited the expenditure for such a die would not be justified.

Hand-indexed dies may be used on any standard single-action punch press that has an open frame. Very accurate work can be produced with such a die if care is exercised in maintaining the accuracy of the locating finger and the index ring. Since there may be any number of jobs going through the plant in which the same number of holes or slots may be required, although the apertures may not be of the same shape, the hand index may be made as an individual mechanism and not as

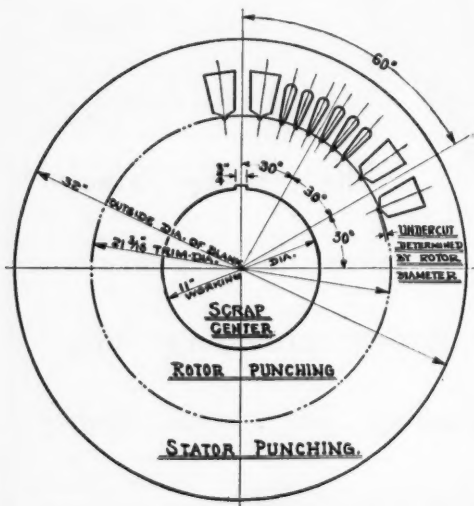
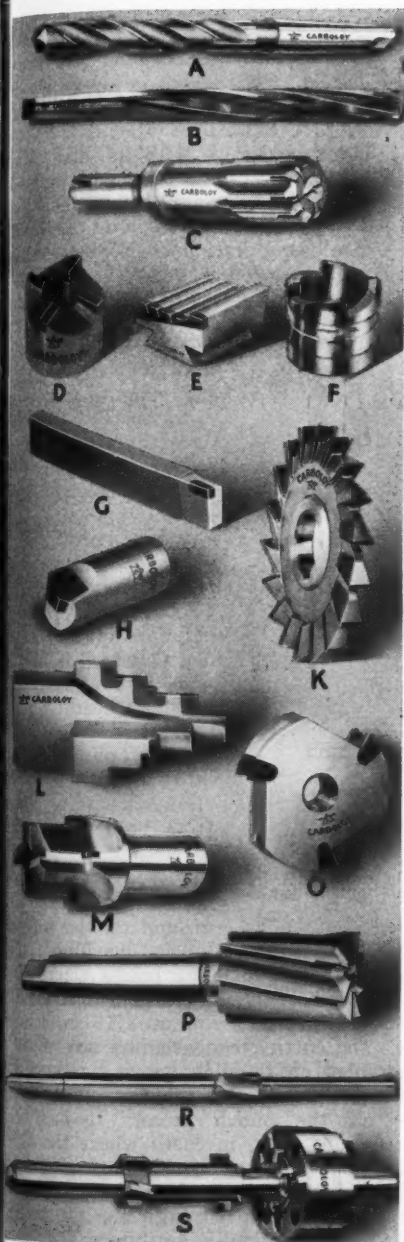


Fig. 1—Complete stator-rotor blank before being separated. The slots are shown in the stator punching.

of such blanks, the dies being made with either a single hole or slot or so that the die will complete the punching of a group of two or three holes at the same time, the holes be-

ing an integral part of the die. Thus the index can be used on any job of this type. Of course, this procedure will in time cause wear on both the locating finger and the notches in the index



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ring, but these parts should be carefully inspected from time to time and kept in repair so that the ring will always locate itself correctly and thus assure a perfectly spaced punching.

A round sheet steel blank is illustrated in Fig. 1. The usual method of producing these large round punchings is to use separate standard round hole dies for blanking out both the inside and the outside

series of two large slots and six small slots alternately around the entire blank. The inside or working diameter is punched to 11¼-in. diameter while the finished dimension of the blank center is 21.187-in. dia. After the slots are all punched, the blank is trimmed by a 21.187-in. dia. trimming die which completes the blank. The remaining part is then usually used to produce the rotor punching.

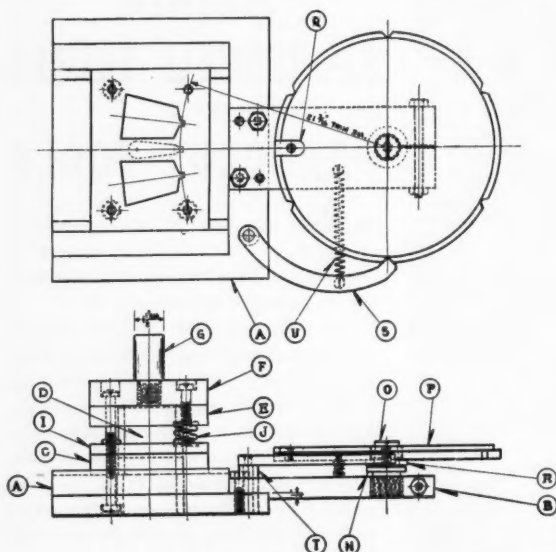


Fig 2—Illustrating the complete assembly of the double slot die and the indexing attachment used in conjunction with it, bolted in place on the die shoe.

of the punching. In the following operation the single keyway is punched in and the blank is then located from this keyway on the index ring. The scrap or center part is usually kept to be used up in making smaller punchings. To complete this stator punching, two separate slot dies are used each having its own index plate but both using the same indexing assembly.

It will be noted that on this blank the winding slots are punched in

Figure 2 illustrates the complete assembly of the double slot die and the indexing attachment bolted in place on the die shoe. A is the machine shoe, die shoe, machined to leave a holding ledge on the two sides and also a ledge in front, on which the index arm is bolted and doweled. The shoe A is undercut for letting in the die, C, which is held in place by four ¾-16-thr. fillister head screws. Clearance holes are burned or machined into the die shoe to allow the scrap slug from both dies to fall through.

The die C is made from tool steel, sharpened on the top and ground on the bottom and finished-machined, then hardened to 80-85 points scleroscope. It is best to make these dies about 1½ in. high with ¼ in. to 3/16 in. flat on the cutting edges before any taper is filed on to allow more clearance for scrap and also to ease up the work of the punch press. It has been found that, in cases where the taper has been omitted, more power is actually required to push the collected scrap through the die than it took originally to blank the piece.

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The die is made larger than the punch by the usual amount of clearance.

The punch D is made to size from tool steel and is hardened the same as the die with the exception of the upper part, which is left soft. The punch is usually ground to finish size, and is then press-fitted into the machine steel punch plate E and peened

G screwed into it by which it is held in the ram of the press. It is to use the 1½ in. dia. stem as it be used in the smaller presses and if required, a bushing such as shown at H, Fig. 3, can be used to adapt it to the larger-size press.

The stripper I is ½ in. thick ground machine steel stock and

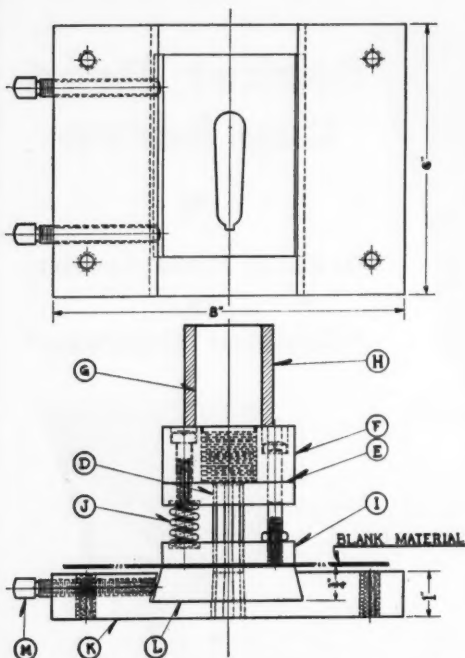


Fig. 3—This drawing shows the single slot die that punches the six smaller slots, one at a time, into the blank.

over. The entire top surface is then ground to assure a flat surface for contacting with the bottom of the punch holder F. The punch holder is made from 1½-in. thick machine steel, slab ground on the top and bottom and provided with the necessary screw and dowel holes for holding the punch plate in position. It also has a 1½ in. or 2 in. dia. punch stem

held by means of four filling head screws which move up and down with the stripper, clearance being provided in the punch holder for the head screws. These screws are provided with nuts for adjusting and locking the stripper and the downward movement is actuated by eight compression springs J. The stripper should be machined a slip fit around the punch. It is employed primarily to keep the material being cut flat and then to strip or push the blank back off the punches.

Figure 3 shows the single slot die that is also used on the blank. The construction of the die assembly is the same as one previously described with the exception that the machine steel die holder plate K is machined to the same size as die C, so that when it is moved from the die shoe A, holder K can be inserted and fastened in place. This plate has a groove cut through the center from front to back and the sides machined to a 15° green angle. The single slot L is machined to the same angle after the die has been placed in position, it is held in place with the set screws M.

Construction of the Indexing Mechanism

The 1 in. thick machine steel indexing arm B, Fig. 2, is machined back to a depth of ¼ in. on the end where

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it is seated and fastened to the die shoe A. This arm is carefully laid out and is drilled and tapped to suit the index plug N. The arm has a $\frac{1}{8}$ -in. saw cut that runs into the tapped hole and has a $13/32$ -in. dia. clearance hole through the two parts. A $\frac{1}{8}$ -16-thd. machine screw goes through this hole and is used to permanently hold the index plug in its set position.

The index plug is made of high carbon tool steel and is threaded 12 threads per inch on the one end, the opposite end being turned to 10 degrees taper on a side. This is checked with a ring taper gauge to make certain the entire surface is perfect. The $\frac{1}{4}$ -in. thick collar in the center has four openings for adjusting with a spanner wrench to the desired

location. The index plug is case hardened to resist wear. A $7/16$ -thd. tap is run in $1\frac{1}{2}$ in. deep on the tapered end to suit the special index screw O, which is used to fasten down the index ring or plate. The head of this screw is made about $\frac{1}{4}$ in. larger than the tapered end of the index plug and has a screw driver slot in it. This screw is made from cold rolled steel and is case hardened.

The index plate P is burned out to shape from $\frac{5}{8}$ -in. thick hot rolled sheet steel, allowing $\frac{1}{4}$ in. all around for machining. Following the burn-out operation the plate is annealed so as to relieve both the rolling and burning-out strains. It is then slab-ground on the top and bottom, laid out, and finish machined to drawing dimensions with the top part cut back to a depth of $\frac{1}{4}$ in. to form a ledge on which the blank rests while it is being indexed and perforated.

The key opening is profiled in position and the required number notches are cut into the side. The Q is made of high carbon steel shaped to size, case hardened, and anchored in place with a countersunk-head screw.

The index bushing R is made of bronze with a $\frac{1}{4}$ -in. shoulder at the bottom in which two openings are machined so that adjustment can be made with a spanner wrench. $1\frac{1}{2}$ -12 P. thread is cut on the outer end for screwing into the bottom of the index plate. The plate is adjusted by this bushing so that

it stands a few thousandths of an inch under the index plug; then when the screw is tightened down the bushing keeps the plate from rising, yet it does not bind its movement.

The index plugs, bushings and screws may be kept in stock in the store room as they are always the same and are interchangeable in case of repairs. It is also cheaper to make several at a time instead of one at a time as needed. The keys may also be made in the manner shown in Fig. 4, partly finished and requiring only a small amount of bench work to complete them for use in production. They can be mill-cut up in a group of 10 or 15 at a time and stored to be used as required.

The index finger S is made of cold rolled steel shaped to suit the job in hand. The indexing point should be case hardened to reduce wear. The cold rolled steel finger support T is press-fitted into the die shoe and the finger is held in place by a stainless steel pin that is riveted over at the top of the finger and extends down into the support. The pin is made

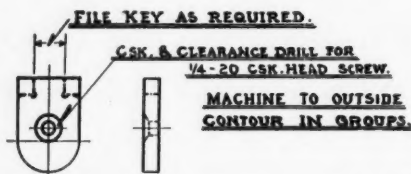
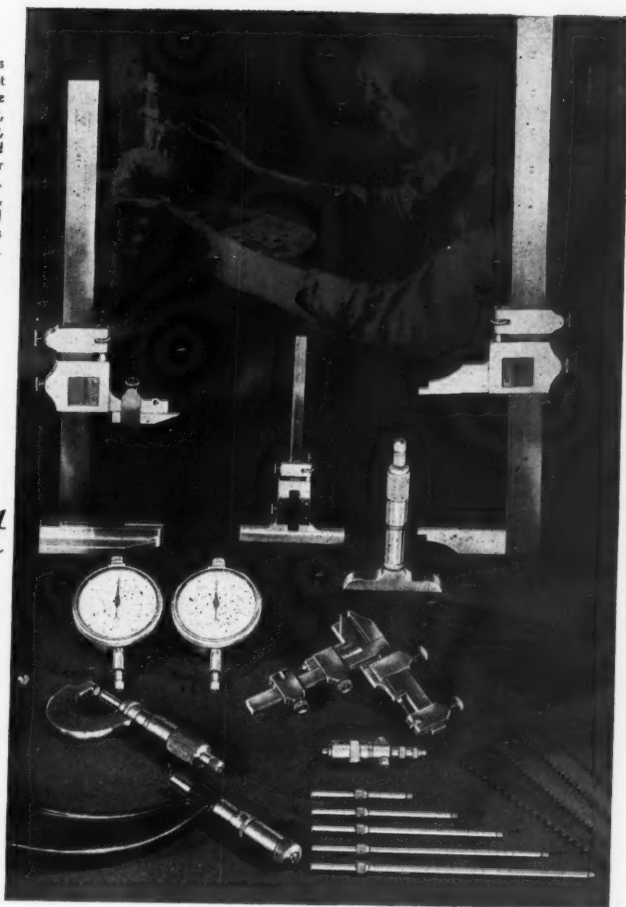


Fig. 4—Drawing illustrating the partly finished index keys as kept in stock.

The Starrett Tools shown in this photograph are Vernier Height Gage No. 454, Vernier Depth Gage No. 448, Vernier Caliper No. 192, Micrometer Depth Gage No. 449, Starrett Dial Indicators 25-A and 25-F, Gear Tooth Vernier Caliper No. 456, 6-inch Micrometer No. 230, 1-inch Micrometer No. 230, Inside Micrometer No. 124-A and Starrett High Speed Hacksaw Blades for hand frames and power machines.



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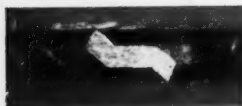
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to a close slip fit in the support. The indexing finger is pulled into the notches in the index plate by the expansion spring U, which is fastened to the index arm with enough tension on it to pull the finger back into indexing position.

In Fig. 5 an index plate V for single slot die is illustrated. The construction is identically the same as the one previously described with the exception that the notches are cut in groups of six to suit the six slots

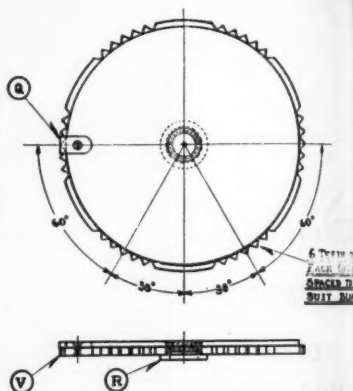
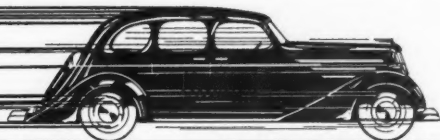


Fig. 5—Showing the index plate used with the single slot die illustrated in Fig. 3.

in the blank. The locating key and index bushing are in place as they are a permanent part of the plate.

The rotor slot dies are made in the same manner as the stator dies, each having their own shoes and separate indexes to suit the blank dimensions. Quite often several slots or a group of slots may be made on the same shoe by enlarging the scrap holes, but the fact should be kept in mind that if large slots are being punched without adequate under-support to the die, breakage may result. The small amount of saving that might have been effected by using an existing die shoe in such a case would be far offset by the cost of a new die.

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Internal Gear and Pinion Arrangement for Actuating a Magazine Pusher Finger

BY J. E. FENNO

SOME of the most difficult problems in machine design are those involving the reconstruction of ma-

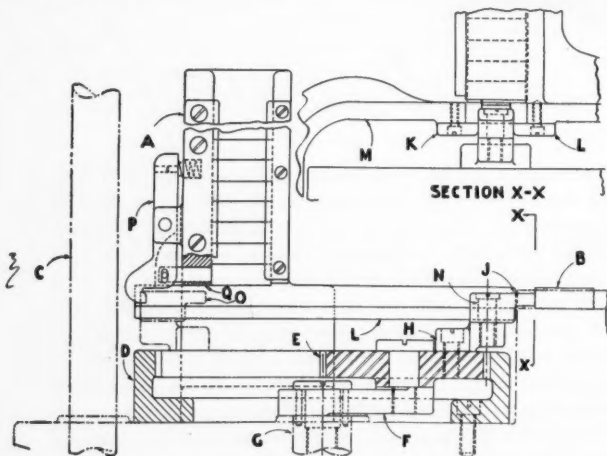
the position on the machine indicated at **B**. Owing to the close proximity of the shaft **C** the ordinary pusher feed slide could not be used here since it would have conflicted with the shaft and the magazine could not be located closer to the part **B** to accomplish this because of other obstructive machine parts (not shown). Another

objection to the ordinary pusher slide was that the space under the slide was too limited to contain a long slide movement in the usual manner.

In the mechanism shown, the horizontal motion of the slide is based on the geometric proposition which states that a circle rolling on the side of another circle twice its diameter will reciprocate in a straight path, the motion

ment in either direction being equal to the diameter of the larger circle. In the design shown, the outer circle corresponds to the stationary intermediate gear D and the inner circle to the pinion gear E pivoted to the end of arm F. This arm is secured by a screw and dowels to the end of shaft G, which is a part of the machine as originally designed.

Upon a bracket H secured to g



Drawing of an internal gear and pinion arrangement for actuating a magazine pusher finger.

chines to adapt them to current changes in product specifications or to step up production. The latter requirement presented one difficulty in a certain packaging machine in that the old hand method of feeding was to be superseded by a magazine feed and the space for the feed slide was extremely limited.

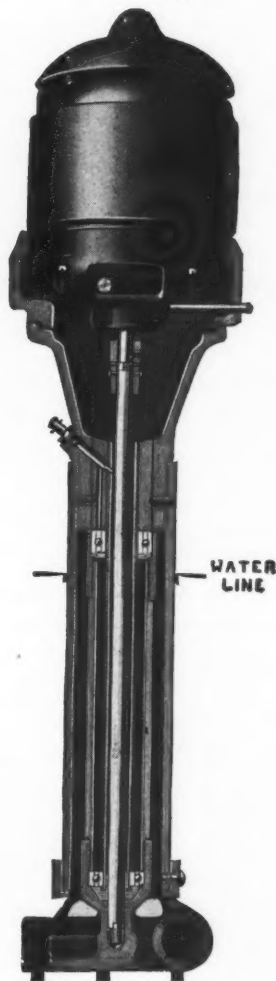
Referring to the illustration, the part is fed from the magazine A to

B is pivoted the pusher finger J which projects between the work supports K and L. Support K is secured to the bracket M which in turn is fastened to the side of the machine. Support L is fastened to the base of the magazine. With this arrangement, the bracket M and the base of the magazine form a guide to remain the work as it is fed by the finger J along the work supports to the machine. Incidentally the rear extension of the magazine base is fastened to the machine although this connection is not shown.

The pusher finger J is shown at the end of its stroke toward the right where it has deposited the part B in the machine. As shaft G continues to rotate, the gear E rolls around the gear D and since the center of stud X is in a position corresponding to the point on the circle mentioned in connection with the geometrical proposition, then the center of this stud will move toward the left in a straight line and carry the pusher finger back to the position indicated in dot and dash outline at O. In reaching this latter position, the heel of the finger pushes the lever P back and withdraws the pin Q which normally presses against the work and holds the column of parts from dropping when the bottom part is removed.

When the pressure on the work is released in this way, the column drops, the lower part resting on the supports K and L. As shaft G continues to rotate, the finger J reverses its movement and moves toward the right pushing the bottom part in the column with it. In doing so, the finger recedes from the lever P allowing the latter to return the pin against the succeeding part and hold the column in position. Continuing the movement of the finger toward the right, the moving part is carried to the position formerly occupied by

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part B. This completes the cycle.

One of the advantages of this design is that the movement of the finger is accelerated at the beginning of the stroke and retarded at the end of the stroke thus assuring the smooth action which is so desirable when feeding work of a frail nature. Its compact design, when the relatively long stroke of the pusher finger is considered, is another feature which might suggest its use for similar applications.

Automatic Indexing and Piercing Die

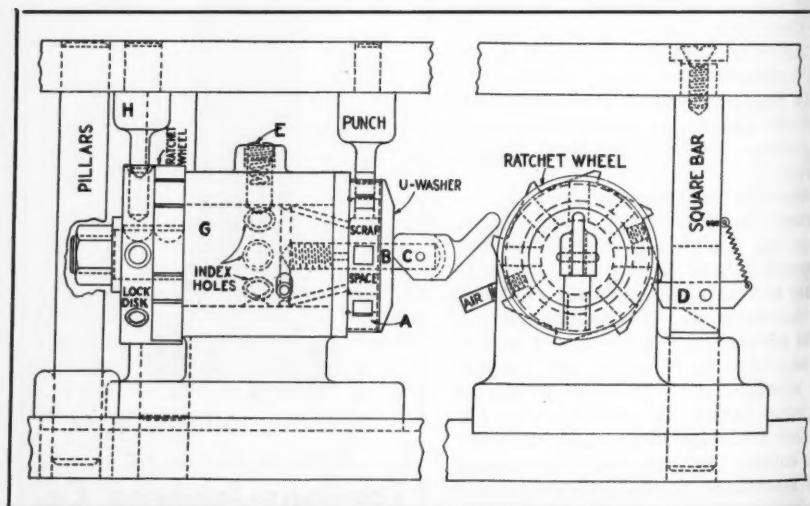
BY WM. C. BETZ

In punch press work, as in other work, the operation must be performed quickly and accurately. However, due to the nature of the equipment, the factor of safety is a more important consideration in punch press operation, than in most other work, consequently the type of die

shown in the illustration should find many applications.

The die illustrated here was designed to index the work automatically, the indexing mechanism being actuated by the press mechanism. In operation, the work is slipped over the die ring A, the U-washer is slipped into position over the stud B, and cam C locks the work in position. The operator removes his hands from the die, trips and holds the treadle down until the press has made the necessary number of strokes, snaps the cam C to release the U-washer, removes the pierced work-piece and replaces it with another blank. Then the operation is repeated. From 400 to 600 pieces per hour may be pierced with one of these dies, depending upon the number of holes required in the work.

It will be seen that as the ratchet pawl D leaves the ratchet wheel slot, the primary lock, in the form of a ball and plunger actuated by a coil spring, indicated at E, slips into one



Drawing showing design of automatic indexing and piercing die for punching rectangular slots in sheet metal retainers for roller bearings.

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of the index holes in the stud G to hold the stud in position. The ratchet wheel is operated by the pawl D, which works up and down as the ram of the press ascends or descends.

It will be noted that the pawl has a coil spring at the rear which pulls it down onto its seat in the bar. When the pawl contacts the ratchet wheel, on its downward stroke, it throws the pawl up, allowing it to slip past the wheel. As the pawl clears the wheel, the spring pulls it back into position to engage one of the teeth on the ratchet wheel in the following index stroke.

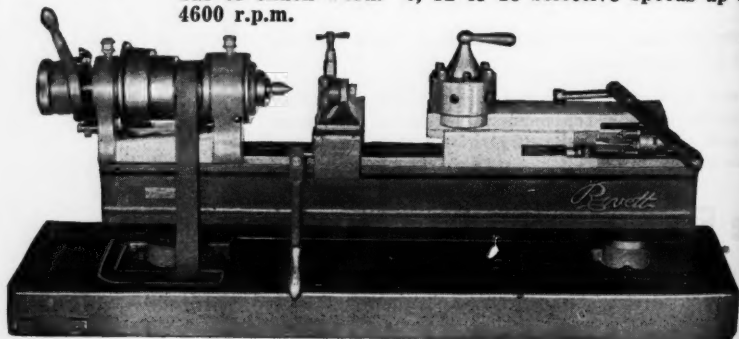
As the press ram nears the top of its stroke, the ratchet disengages the tooth in the wheel. The exact time that the pawl leaves the ratchet wheel tooth must be determined and the pawl ground to the correct length to take care of this timing so that the auxiliary index plunger E may enter one of the holes in the stud G.

On the downward stroke of the press, the positive lock pin H enters one of the holes in the lock disk and thus locks the stud G against rotation while the piercing punch does its work. The lock pin H must be of such length, however, that it does not interfere with the operation of the ratchet wheel on the upward stroke of the pawl bar. To do this the pawl should be allowed considerable clearance at the bottom of the ram stroke, below the ratchet tooth that it is to engage.

The pierced slugs drop into the space around the stud and may either be scooped out or blown out by a jet of air from a hand or foot valve, located at the left of the fixture. To fit the die for air, an air connection is screwed into the shaft casting in line with a groove in the bore of the stud G. Either six or eight holes are drilled into the periphery of the stud to meet the groove in the bore.

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In making the die ring A, slots are machined in the periphery as required. When the work edges become dull, the ring is discarded and a new one is made because the ring would be undersize if it were reground and an undersize ring would distort the work and allow inaccuracies in the indexing. The ring is attached to the index stud G by the use of headless setscrews, as shown.

This fixture can be used on any job where accurate indexing is necessary. Holes of any shape may be pierced, to any size within the capacity of the fixture. The fixture shown was designed to pierce rectangular slots in sheet metal retainers of various sizes for roller bearings.

U-Bolt Bending Fixture

By CHARLES KUGLER

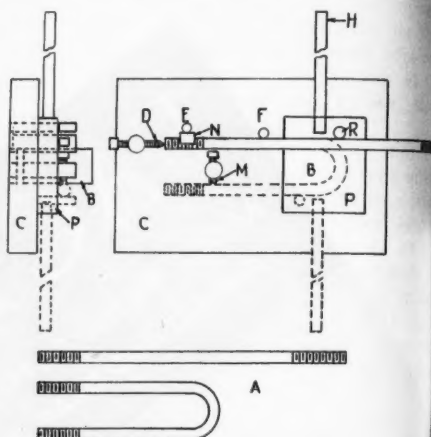
AMONG the jobs allotted to the writer was one which consisted of designing and making a cheap fixture with which to bend a small lot of U-bolts. The result was the fixture shown in the drawing. The entire fixture was made from available material, mostly scrap, and the only machine used was a drill press and a power hacksaw.

It is evident that the only part that had to be made to a definite size was the form which determined the dimension of the opening in the U-bolt, indicated at B on the drawing. This part is 1 inch in diameter, and consists simply of a section of 1-inch round stock pressed into a hole of corresponding size in the plate C.

After cutting the blanks to length and threading them, as shown at A, each blank in turn was placed in the fixture in contact with the stops D, E and F. To prevent damaging the threads as result of the tension set

up during the bending operation, a nut was cut in half and placed as shown at N. The pins E and F are set into the base, as shown.

The pin R is set into a plate, P which revolves about the round section B when moved by means of the



Design of U-Bolt Bending Fixture.

handle H. An adjustable stop M is provided to limit the movement of the handle H at the end of the stroke. To operate, the section of stock is placed in position against the stops D, E, F, and R, then the handle is pulled around until the stock strikes the stop M. The dotted lines show the position of the handle and U-bolt after the bending operation has been completed.

An Adjustable Boring Tool

By J. A. HONEGGER.

A COMBINATION boring bar and sweep tool of simple construction, in which the disadvantage of an eccentric load or dynamic unbalance is practically eliminated, is shown in the accompanying illustration. Bars of this type can be run at a much

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INGERSOLL ~~ZEE~~ LOCK

Side Milling Cutters

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- Positively Locked ● Positively Reset
- Doubly Adjustable ● No Additional Parts
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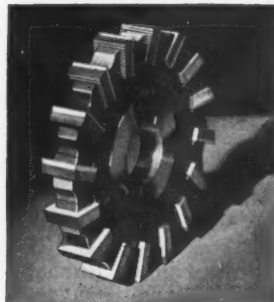


(Above) Ingersoll Zee-Lock Half Side Milling Cutters for Side or Straddle Milling.

(Center) Ingersoll Zee-Lock Staggered Tooth Cutters for Slotting, Keyways, or Channeling.

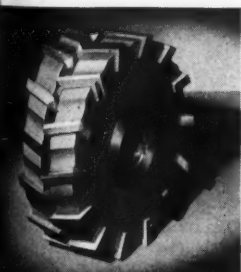
(Extreme Right) Ingersoll Plain Side Milling Cutters for Accurate Slotting.

(Below) Ingersoll Interlocking Milling Cutters for Side Slotting or Channeling.



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With tough and strong housings of forged and heat treated chrome Molybdenum Alloy Steel. ● With hard and heat resisting Cutter Blades of High Speed Steel, Super-Cobalt High Speed Steel, J Metal Stellite, or Tipped with Cemented Carbide.



Ingersoll Zee-Lock Staggered Tooth Cutters may readily be reset for width, as the alternate Zee-Lock Cutter Blades move axially and positively when adjusted outward one rotation.



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THE INGERSOLL MILLING MACHINE CO.
Rockford, Illinois

higher speed with less hammer on the spindle and spindle bearings of a machine, which in turn will give a

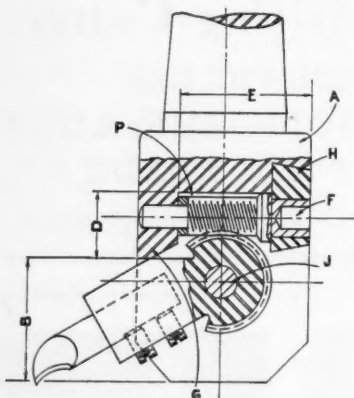


Fig. 1—Drawing showing adjustment mechanism of boring tool.

much smoother cut.

The tool consists of a high carbon steel holder A, Fig. 1, in which a side milling cutter has been sunk to the depth B leaving a rectangular through slot C. For the additional depth D, an end mill is sunk into the holder to the depth E, which thus forms the pocket for the adjusting screw F. Corner G is then milled away for clearance, after which

a very snug fit in holder A. This holder pivots upon the pin J shown in Fig. 2. The pin is so constructed

that the head of the pin presses upon the tool holder, by which means the holder is prevented from riding free in the slot. The amount of pressure that is applied to the pin is adjusted by set screw K and is then locked in position by means of the lock screw L. To prevent pin from rotating, the cross pin M is inserted, riding against a flat that has been milled or ground on one side of the end

of the pin J.

Referring again to Fig. 1, the dovetail insert N is next fitted into

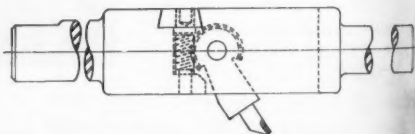


Fig. 3—Boring bar in which segmental worm wheel and tool holder is used.

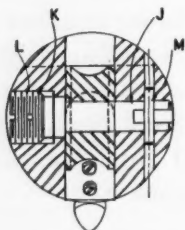


Fig. 2—Drawing illustrating method of applying tension to the tool holder.

the dovetail slot H is cross-milled.

The segmental worm wheel and tool holder is next made up and is

the holder A. When this has been properly fitted, adjusting screw F is screwed in. The thrust washer P is machined so that all endplay of screw F is eliminated. On the outside face of the dovetail piece N graduations are inscribed. These graduations represent parts of a revolution of the screw F and are not any definite measure of tool adjustment.

This construction is also adaptable for use with a stationary boring bar for lathe operations. Such a construction is shown in Fig. 3. The writer employed this construction recently

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with some very satisfactory results. It should further be noticed that if a suitable key is inserted in the square hole of screw F certain internal spherical surfaces may be machined by rotating the screw F.

TREATISE ON THE DRESSING AND TRUING OF GRINDING WHEELS. This booklet, issued by The Carborundum Company, Niagara Falls, N. Y., contains 46 pages of useful, practical information concerning the best methods and tools to use in dressing and truing grinding wheels of all kinds and types. The text contains descriptions and illustrations of different kinds of dressers, and gives the specific purpose for which each should be used. Directions are given for feeds of dressers for the production of different kinds of surfaces.

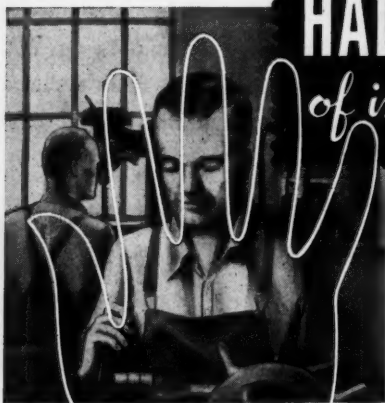
Among other subjects covered are these: Industrial Diamonds; Diamond Characteristics; Diamond Sizes; Care of diamonds; Mendes D-P Diamond Dressers; "Staset" Diamond Dressers; Carboloy Truing and Dressing Tools; Koebel "Multi" Diamond Dresser; Industrial Diamond Co. dressing tool;

Truco Dressing Tool; Central Tool Co. dressing tool; General Rules for Application of Diamond Tools; Effects of Coolants on Dressing; Truing Wheels to Precision Radial, and many more.

The book is well illustrated with photographs and drawings. A copy will be sent to any mechanical executive who requests it on his firm letterhead.

LANDIS INTERNAL AND EXTERNAL HYDRAULIC RACE GRINDERS are discussed in detail in Catalog No. G-94, which has been released by Landis Tool Company, Waynesboro, Pa. These machines are designed especially for the grinding of internal and external ball races, and are designed to provide many mechanical refinements that make them applicable for the task for which they are intended. The refinements are illustrated and described in detail in this book. Copies free to plant executives.

Your August copy of MODERN MACHINE SHOP will be your guide to the Machine Tool Show, to be held in Cleveland Sept. 11-21. It will not be placed in the mails until August 20.



HALT THE DANGER of infected cutting oils!

Wherever cutting oils or cutting compounds are used, there you will find Oil Dermatitis. The germ of this skin disease infects lubricants during use. When carried into abrasions of the workers' hands, it causes serious skin infections, which lower plant efficiency.

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Over the Editor's Desk

AT a recent meeting of the American Society of Mechanical Engineers, Mr. George Seyler, Works Manager for the Lunkenheimer Company and Chairman of the Society's Committee on Education and Training, gave a report on the labor situation which indicates that the shortage in skilled mechanics will be serious if the industrial situation returns to normal. The shortage may amount to 100,000 workers, according to Mr. Seyler.

Quoting from a report of the National Industrial Conference Board, Mr. Seyler gave figures which indicate that, with millions of workers still unemployed, the need for trained mechanics is on the verge of being acute. Among the 287 manufacturers who replied to the questionnaire sent out by the Conference Board are many who even now are having considerable difficulty in finding skilled workers, and there is no question but that the situation will become more critical as business improves.

Some of these manufacturers are put to the necessity of interviewing scores of applicants in order to find a few men who have had sufficient experience and training to make them competent to operate the more complicated machines, or to be trusted with maintenance or tool work. All-round machinists or mechanics trained to operate the more important machine tools are at a premium, and in some cases extensive advertising for such workers has failed to provide enough mechanics to fill the need.

There is a reason for this situation, of course. In addition to the number of skilled men who annually pass from the metal trades field due to natural causes, during these past five

years thousands of trained mechanics have drifted into other fields and cannot be counted upon to return. The advantages of prestige and higher wages usually enjoyed by the trained worker have lost their importance in the face of steady jobs at perhaps less desirable work and lower wages. Some of these men who might have continued at their trade until retired by age have put their savings into small businesses of one kind or another which may entail harder work at long hours, but which offer security from periodical layoffs. These men will not come back again.

Another reason for the shortage, according to the report of the Conference Board, is the restriction on immigration. The thousands of skilled mechanics who formerly crossed our borders annually have dwindled to a small percentage of the former number, and the fact is that for the past several years the number of foreign-born who have been leaving this country each year is greater than the number of those who entered.

It is evident that the metal trades is going to feel the lack of skilled labor until a new crop of mechanics and artisans can be trained. It is practically a hopeless matter to try to bring any of them back into industry with the lure of high wages, and attempting to fill the individual manufacturer's needs by drawing men from other plants through competition in the matter of wages is poor business, looking at it from any angle.

The best way to obtain trained men is to train them, and the best time to institute the training program is right now. An apprentice training system is not difficult to introduce and maintain, and full information on the subject is available from a number of sources.

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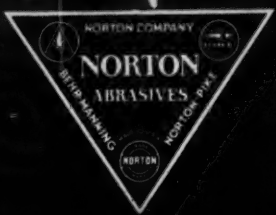
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NEW SHOP EQUIPMENT

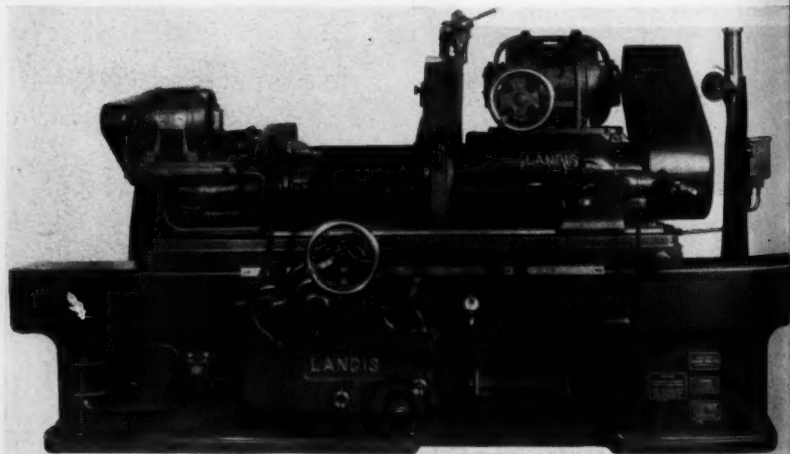
Landis Type D Plain Hydraulic Grinding Machines

The 10-inch, 14-inch, and 16-inch Type D Plain Hydraulic Grinders now being built by Landis Tool Company, Waynesboro, Pa., are modern high production machines in which are embodied many new features of design. The 10 and 14-in. sizes may be used for the grinding of spindles and shafts of many types and sizes. The 16-in. sizes may be used instead of the 10 and 14-in. sizes for the grinding of many of the foregoing parts which might require a machine of greater swing. Small straight faced rolls may be ground to advantage. Because of the weight, size, and power of the machines, they may be used for wide wheel and multiple wheel grinding.

The end wheel spindle drive is thru multiple V belts. Flood lubricated cap-type babbitt-lined steel wheel spindle bearings are used. This feature makes possible the utilization of less wheel spindle clearance than is ordinarily required. As a consequence, better finish is secured. A 30-in. diameter grinding wheel is considered standard. Provision has been made, however, for the use of a 36-in. diameter wheel on 10-in. machines, or a 42-in. diameter wheel on

14-in. and 16-in. machines. These large diameter wheels are especially desirable where crankshaft line bearings are to be ground as their use considerably decreases the amount of time required for wheel truing and wheel changing.

The Type D hydraulic system is of the dual cylinder type. It provides a wide range of work table speeds with smoothness of traversal at any speed between the minimum of 6 inches per minute and the maximum of 240 inches per minute. Due to the use of dual cylinders (one for movement in each direction), the volume of oil in each is constant and the speed is therefore constant in both directions. Table speeds are regulated by a convenient valve which governs the flow of oil from the end of one cylinder to the corresponding end of the other. The hydraulic straight in mechanism is available, altho it is considered standard equipment. It is a feature almost indispensable to straight infeed grinding operations such as crank-shaft line bearing grinding, multiple wheel grinding and most wheel grinding. When used, it causes the wheel to feed in rapidly until it is about to come in contact with the work at which time it slows down automatically to the predetermined grinding feed



Landis Type D Plain Hydraulic Grinding Machine

and continues to feed in at this slower rate until the base comes against the positive stop. Reversal of the control causes the base to feed rapidly back to the starting position.

The final work drive; that is, from the jack shaft to the face plate, is thru multiple V belts. Thereby the smooth delivery of power is assured, regardless of the load or variation of the load. The work drive motor is of the constant speed type, a range of 65 to 100 r.p.m. being available simply by changing of an easily accessible belt and pulleys at the end of the headstock. The work carriage ways are flood lubricated. A small reservoir at the rear of the machine is kept continuously filled with filtered oil from the hydraulic system, the oil feeding by gravity to the ways.

The Type D Machines are convenient to operate, inspect or service. The work center line of the 10-in. Machine is but 4 inches from the floor. On the 14-in. machine this distance is 38 inches, on the 16-in. machine, 39 inches. Particularly when parts of considerable weight, such as large spindles or crankshaft line bearings, are being ground, the short lift conserves the operator's energy tremendously. The lower portion of the bed is cut out in front, giving toe room so that the operator may conveniently stand close to the machine. In addition to this, the various controls are fitted snugly against the bed and covered with the smooth cover. All of the hydraulic controls are at the front of the bed, behind one cover. The entire pump drive is mounted on the outside of the bed at the rear. The wheel spindle drive may be gotten at quickly by the removal of one cover, while a cover at the front of the wheel base, when removed, exposes wheel spindle, bearings and wheel spindle bearing lubricating pump.

The new Type D Machines are offered

in hydraulic or hand traverse, in swings of 10-in., 14-in. and 16-in and in lengths of 18-in., 36-in., 48-in. and 72-in. The wheel drive motor is either a 20 or 25 h.p., depending upon the wheel used. The pump drive motor is 3 h.p., and the work drive motor either 1 or 1½ h.p. depending upon the swing. All are constant speed motors. Weight of the machine is more than ample, the 10x36-in. size, for example, weighing 12,850 pounds, net.

Warner & Swasey No. 4 Universal Turret Lathe

A No. 4 Universal Turret Lathe of a new size, embodying a number of improvements, has recently been announced by The Warner & Swasey Co., Cleveland, Ohio. This machine, like others in its line, has been developed to utilize to best advantage cemented tungsten carbide, in addition to high-speed steel cutting tools. It has 12 spindle speeds which range from 30 to 751 r.p.m. and a 7½ h.p. motor may be used. Provision is also made for the application of a two-speed motor, giving an additional 12 speeds. It is a stronger machine throughout with increased capacity—swing 18¼-in. and bar capacity 1¾-inch.

Anti-friction bearings are found throughout the head of the machine with the front bearing of the spindle mounted on double roller bearings. All head gears are of chrome nickel alloy steel, hardened and ground. Hardened steel strips in the turret saddle are replaceable—making this a wear-proof unit. The circumference binder ring automatically clamps the turret after indexing. The travel of the turret slide is 12 inches, with the power feed applied through a friction clutch.

A feature of the cross slide is its large dial so graduated that 1/16-in. move-

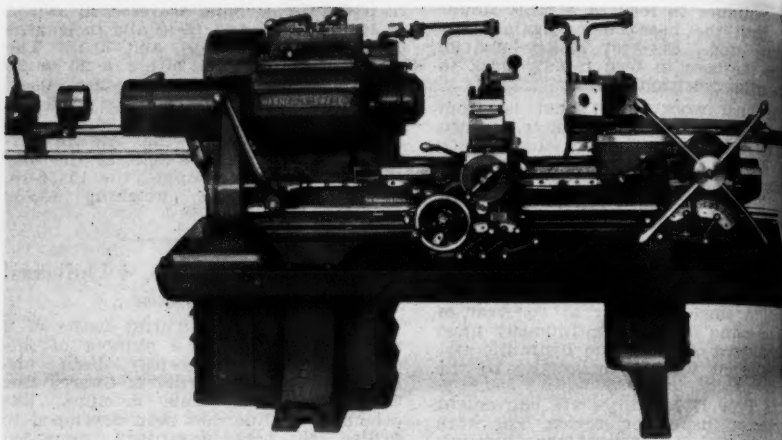
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- Built-in conduit box simplifies wiring and increases compactness.
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Warner & Swasey No. 4 Universal Turret Lathe

ment of its rim advances the slide 0.001-in. A new automatic indexing square turret offers increased speed in manipulation. Pressure lubrication with grease is used in both aprons which keeps the bearings clean and prevents washing away of the lubricant. A plunger pump on the cross slide lubricates both the slide and the bed ways.

The gear box, grease-lubricated throughout, is equipped with pick-off gears, making it possible to change the entire range of feeds provided by the alloy steel gears found in each apron.

The ratchet type bar feed is designed for fast operation at high spindle speeds. Bar stock is held firmly concentric with the spindle bore by a revolving feed chuck mounted on anti-friction bearings, affording greater speed in loading and less fatigue to the operator in releasing and gripping the bar.

All levers are centrally located for ease of operation. Only natural movements are needed—head levers move horizontally and feed levers move vertically. All feed levers are designed with fingertip control. This design tends to induce the operator in production actually to shift to the most productive feed instead of coasting along on one feed for all diameters. The result is increased output. Direct spindle speed reading for head levers allows rapid manipulation and completely eliminates charts or diagrams and letter symbols to determine the revolutions of the spindle.

Distinct improvements have been made in the taper attachment, making

it usable for all cross slide tool mounted at front and rear position. This unit is of very rigid construction and may be clamped from the operator position.

Materials used in the machine are carefully selected to promote long life and resistance to wear. The lathe is made of high tensile nickel iron with a very high percentage of steel. All



Close View of Head, showing Visual Speed Selector

gears throughout are of alloy steel and heat treated. The spindle and all shafts in the head of the machine are equipped with anti-friction bearings.

DRAWING

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We are getting improvement in very smooth parts.

This stock smoother finish require less gr

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It has increased by 15%.

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Tools run for without redu

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COLD DRAWING PROVIDES MAXIMUM MACHINABILITY



Users of
ADVANCED
Union Free Cut

(S. A. E. 1112)

WHAT THEY SAY:

"We are getting a marked improvement in tool life and a very smooth finish on the parts."

"This stock leaves a much smoother finish and our tools require less grinding."

"A very free cutting steel, much easier on tools and gives an exceptionally fine finish."

"It has increased our production by 15%."

"Its quality is exceptionally good and we are securing longer tool life."

"Tools run four hours longer without reducing speeds."

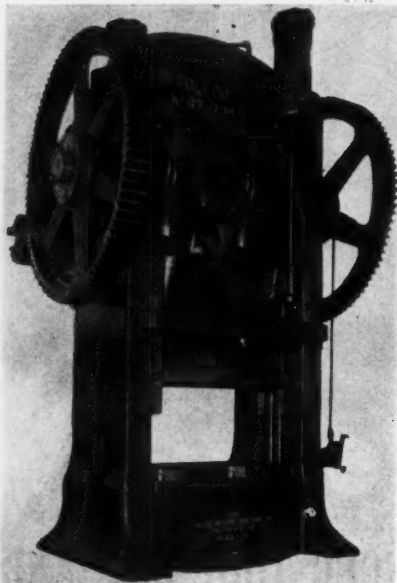
GET LONGER TOOL LIFE AND A SMOOTHER MACHINED FINISH

● New high standards for tool life and machined finish in the manufacture of steel parts from S. A. E. 1112 Bessemer screw stock are being set by Advanced Union Free Cut. It is promoting large savings in tool expense, less required time for tool grinding and tool changes, increased machine output and better quality in the finished job.

Proof of the exceptional merits of this steel no longer rests upon the results of experimental machine tool operations. For many months it has been put through the fault-seeking tests of practical application by hundreds of manufacturers.

Give Advanced Union Free Cut a thorough trial in your production and determine how far it reduces your costs. Within a short distance from your plant is a Union Drawn Distributor prepared to give you prompt delivery from his warehouse stocks.

Union Cold Drawn Steels



Toledo No. 97 Twin-Driven Punch Press

Toledo No. 97 Twin-Driven Punch Press

Considerable effort is being made by The Toledo Machine & Tool Company, Toledo, Ohio, to smooth out the lines of its presses and eliminate corner and dust pockets wherever possible. While this necessarily improves the appearance of the equipment there is back of it a carefully worked out plan for increasing the strength of sections for distribution of the metal in the most efficient manner and elimination of any possible strain lines by the use of ample radii. The No. 97 Twin Driven Press shown is one of the latest designs and is an extremely compact and rugged machine.

Frame members are high test alloy castings of exceptional tensile strength and surface hardness. A high modulus of elasticity obtained in these alloy castings makes possible much greater stiffness of bed and slide members than has been practical in the past. Shrunk steel rods are designed to protect the press from overloading on the heavy bottoming operations for which it is

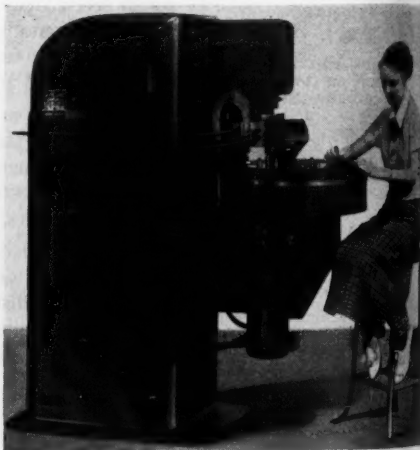
employed. The press is equipped with mechanically controlled self-adjusting pneumatic friction clutch. The ressnappy action of this clutch permits considerable increase in production rate over the older clutches. The equipment also includes pneumatic counterbalancing cylinders, cross bar knockout in side and direct-connected liftout in the base.

Taylor-Winfield Automatic Electric Resistance Heating Machine

The machine illustrated—a product of The Taylor-Winfield Corporation, 1430 Third Ave., Detroit, Michigan—was designed to heat, electrically, tapered studs made from screw machine stock for subsequent hot forming in a press. Meeting a demand for 1,000 heated studs per hour, the actual current dwell for the heating of two pieces simultaneously is less than three seconds. A 75-watt transformer is used, mounted within the base.

In principle and construction, the machine follows the general arrangement of Taylor-Winfield spot or projection welders. The base and other parts of the frame are made of welded sheet steel which, while having the appearance of cast metal, is lighter and stronger.

Except for feeding of the studs by hand into the indexing fixture, the operation of the machine is entirely automatic. The dial mechanism is operated by a small motor through a gear reduction, moving the dial from station to



Taylor-Winfield Automatic Electric Resistance Heating Machine

Fig. 1—Taylor-Winfield Automatic Electric Resistance Heating Machine

station at a time. The machine is designed to bear on the air cylinder indexing mechanism so synchronous operation of the studs having predetermined time of ejection by which carbon hot forming current distribution is similar to that of the hot forming current distribution. Similar to the hot forming current distribution, the machine concentrates the energy of the current in the work piece, making the operation more efficient and economical.

Improved and Taylor-Winfield Automatic Electric Resistance Heating Machine

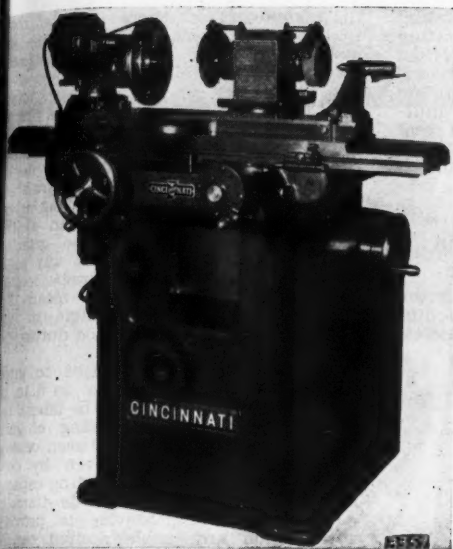


Fig. 1—Front view of Improved Cincinnati No. 2 Cutter and Tool Sharpening Machine.

gation at a speed convenient for loading. The upper electrodes are brought to bear on the studs by means of an air cylinder operated from the dial indexing mechanism, all movements being so synchronized that no attention from the operator is necessary. After the studs have been heated to the desired predetermined temperature, they are ejected by air into an inclined chute which carries them to the press for the hot forming operation. The length of current dwell is governed by an electronic timer.

Similar equipment is made for a variety of heating operations, both large and small, and for practically any shape of material. The process is well adapted to the production heating of wire or slugs from which bolts are made; especially for metals not suitable for cold forming. Electric resistance heating concentrates the heat where it is needed since the heat originates in the metal, and there is comparatively little waste of energy. It is controllable, clean, economical, and efficient, and eliminates uncomfortable room temperatures.

Improved Cincinnati No. 2 Cutter and Tool Sharpening Machine

The Cincinnati No. 2 Plain and Universal Cutter and Tool Sharpening Ma-

chine, built by The Cincinnati Milling Machine Company, Cincinnati, Ohio, U. S. A., and illustrated in Figure 1, has been improved by the adoption of a solid and heavier table slide and by the addition of duplicate operating controls on the left side of the machine when facing the machine from the rear. In the grinding of large rotary cutters, which this machine is well able to handle, the solid and heavier table slide reduces vibration to a minimum, resulting in a truer and more even cutting edge. The solid table also permits heavy loading when the table is displaced angularly as in the grinding of dovetail milling cutters.

The addition of left hand operating controls increases the adaptability and universality of this machine. Regardless of the type of work, a normal operating position is always possible. In addition, the machine retains such indispensable features as correct location of the work and

tooth rest with respect to the right approach to the grinding wheel, unlimited visibility of the work and grinding wheel, accessibility to make changes



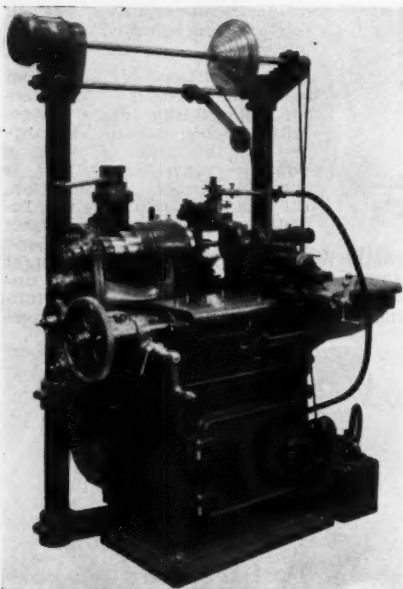
Fig. 2—Duplicate operating controls on the left side of machine. The grinding of left-hand end mills or face mills is simplified by eliminating the necessity of a makeshift tooth rest set-up.

in the setup and to true the grinding wheel without leaving the operating position, and lastly, safety of operation.

No control brings the operator's hands in dangerous proximity of the grinding wheel. The grinding of left-hand milling cutters and spiral reamers is best handled from the left-hand side of machine when facing the machine from the rear.

Societe Genevoise Toolroom Thread Grinding Machine

The illustration shows a motor-driven toolroom-type thread grinding machine which is now being made by the Societe



Societe Genevoise Toolroom Thread Grinding Machine

Genevoise d' Instruments de Physique and marketed through the Triplex Machine Tool Corporation, 125 Barclay St., New York, N. Y. The machine is intended for finish grinding high precision screw threads for external and internal gages and taps or for grinding hardened thread parts for production.

The machine is powered by a 2-h.p. motor which is mounted at the rear of the bed, the drive extending to a back-

shaft and from there to the cone pulley on the machine, providing workhead speeds. Eight wheel spindle speeds are obtained by the use of a grooved pulley on an overhead shaft, this shaft being driven by a 1-h.p. motor.

The accuracy of leadscrews is assured to within 0.0001 in. through the use of a master leadscrew which is protected from dust and dirt. A correcting device on the leadscrew can be seen at the front of the machine. The grinding wheel head can be tilted to any angle of helix. A vertical microscope located above the wheel provides means for controlling the profile angle of the wheel and of the work-piece during the grinding process.

The machine can be used to grind male threads from 3/16 in. to 6 in. in diameter and up to 12 in. in length between centers. The grinding of male threads is accomplished between centers, the work-piece being driven by dogs. For female centers, the grinding capacity is from 1 1/4 in. to 5 in. inside diameter. A diamond truing device is provided with which any angle desired can be obtained on the wheel. A suitable water pump and piping are standard equipment.

Landis Model O Chaser Grinder

The Landis Machine Company, Waynesboro, Pa., has enlarged its line of machines and fixtures for grinding Landis die head chasers by the addition of the Model O Chaser Grinder illustrated herewith. This grinder is suitable for grinding all Landis die head chasers up to 1 1/4 in. in width.

The Model O grinder is a medium size machine of the bench type, but it can be furnished with a pedestal for floor use if desired. It is equipped with a 1/3 h.p. a.c. single phase 120 volt 60 cycle fully-enclosed motor, suitable for plugging into a light socket. The motor and grinding wheel spindles are mounted in ball bearings. The motor has a 1/2-hour continuous duty rating, which is ample for the ordinary requirements of chaser-grinding.

The machine is fitted with two grinding wheels, one being a 6x2-in. cup-shaped wheel, and the other a 7x1/2-in. straight wheel of suitable grade and grain for grinding high speed steel chasers. The right hand side of the machine is fitted with a fixture for grinding the rake and lead angles. Means are provided for swiveling the fixture to obtain the desired angles.

MACHINE TOOL BUILDERS

Expect All Attendance Records
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Cleveland Show, September 11-21

ON September 11 the production world turns its eyes to Cleveland for the nation's greatest of all industrial expositions. For your benefit, manufacturers are assembling new tools and accessories for a running demonstration in a quarter million square feet of floor space.

AS a "preview" to this gigantic exposition, the August issue of MODERN MACHINE SHOP will be devoted exclusively to the Show. Illustrations and descriptions of new tools and equipment, complete floor and booth plans, lists of exhibitors and personnel, and many other features will make the August issue *your personal guide to the Show*.

YOUR August copy will be sent to you on August 20. Slip it in your pocket . . . take it to the Show for a guide and reference.

Plan Now to Attend

Your August copy of MODERN MACHINE SHOP
will be your personal guide to the Show.



Landis Model O Chaser Grinder

Graduations are provided to facilitate the accurate grinding of these angles.

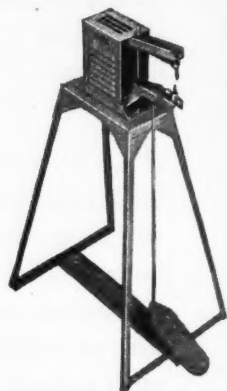
The fixture is mounted on a rotatable spindle which permits oscillating the chaser against the face of the cup wheel for the grinding operation. A cross feed is obtained through a hand knob on the left side of the machine bed. The spindle bearing of the fixture is fully enclosed to protect it from dust and dirt. The chaser is held in the vise by its dovetail shape and is securely tightened in place by means of a hand knob.

An adjustable fixture is also attached to the left side of the machine for grinding the "lip" in the rake angle. A grinder is attached to the table of the fixture to control the lead angle and thus insure uniform grinding. The Model O grinder provides for all forms of grinding Landis chasers as recommended in the Landis handbook.

"Ace" Electric Spot Welder

The Pier Equipment Manfg. Co., 1273 Milton St., Benton Harbor, Michigan, has placed on the market a line of spot welders for either job, maintenance, or production work. The welders are smaller in size than the usual type of spot welder, but the manufacturer claims that the welders are built to stand up under continuous production on jobs where from 16 to 26 gauge steel is used.

The "Ace" Welder is now available in two sizes. The No. 40 welder is built complete with pedal control and steel stand, for 110 or 220 volts, 60 cycles, and will handle up to 600 welds per hour on 24-gauge steel. The No. 50 welder,



"Ace" Electric Spot Welder

with pedal control and steel stand is for use on 220 volts, 60 cycles, and will weld up to 1200 welds per hour on 24 gauge steel, or about 600 welds per hour on galvanized iron.



HOLO-KROME SOCKET SCREWS

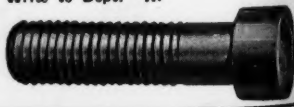
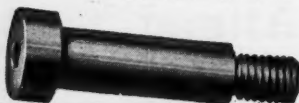
HOLO-KROME SCREW CORP., BRISTOL, CONN.

Free, enough Screws for a test. State size and how many needed.

FIBRO FORGED



New Catalog describing Fibro Forged Screws. Write to Dept. "H."



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Valley Ball Bearing Motor-in-the-Head Buffers and Heavy Duty Grinders

The Valley Electric Corporation, 4221 Forest Park Boulevard, St. Louis, Missouri, is now marketing a line of heavy duty buffers and grinders powered by a motor that is built into the head. Motors are of the "Valley" heavy duty ball bearing type, either 220 or 440 volts, 2 or 3 phase, 60 cycle. Both grinders and



Valley Ball Bearing Grinder

buffers are built in 4 sizes, either 1, 2, 3, or 5 h.p. The size of the shaft in all cases is $1\frac{1}{4}$ inch.

The distance between wheels on the grinder is 20, 21, 23 and 24 inches respectively for the four different sizes and the distance between wheels on the buffer is 27, 28, 29 and 30 inches respectively. The height from the floor to the center of the shaft is $37\frac{1}{2}$ inches for the 1 and 2-h.p. machines and $38\frac{1}{2}$ inches for the 3 and 5-h.p. machines.

The maximum diameter of the wheel on the grinder ranges from $12 \times 1\frac{1}{2}$ inches from the smallest size to $14 \times 2\frac{1}{2}$ inches on the largest size. Guards adjustable to the wear of the wheel can be supplied for the grinder upon request.

Your August copy of MODERN MACHINE SHOP will be your guide to the Machine Tool Show, to be held in Cleveland Sept. 11-21. It will not be placed in the mails until August 20.



Clipper Carded Belt Hooks

*Safest to handle
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For lasting belt joints
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Belt Lacer Company
Grand Rapids, Michigan



Keeping the Count On Production Machinery

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Productimeters will also count objects on conveyors, or run through hoppers, and record strokes of engines, pumps, compressors and stokers.

The standard models include Stroke and Revolution Counters, Wire and Cord Measuring Machines, and Predetermined Counters for stopping machines at a pre-set count.

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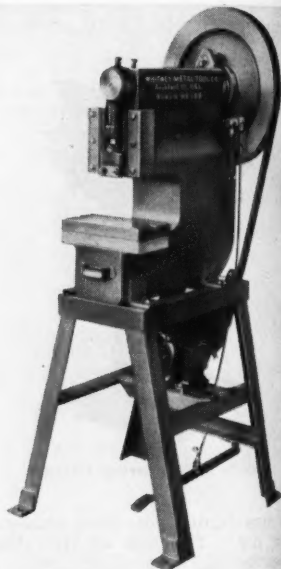
173 Eddy St.
Providence, R. I.

Productimeters

— THE SPEEDOMETERS OF INDUSTRY —

Whitney Heavy Duty Punch No. 128

The Whitney Heavy Duty No. 128 Punch shown in the illustration has been placed on the market by the Whitney Metal Tool Co., 91 Forbes St., Rockford, Ill. In design and construction the punch is modern, strong, and durable, yet of comparatively simple construction. It is built of steel plate of welded box-type design, the safe



Whitney Heavy Duty Punch No. 128

factor for the frame being over 100 per cent of its greatest capacity.

The fly wheel is at the rear of the machine so as to avoid interference with work. A metal drawer is provided to catch slugs. The punch comes equipped with a gear reduction self-contained motor, V-belt drive, 3-station clutch pins in the flywheel, adjustable brake shoe on the main shaft, and a safety device to prevent the ram from descending when changing punches and dies.

The main shaft is of SAE steel and 1 3/4 inch diameter. Length of stroke 1 1/4 in.; length of ram, 7 1/2 in.; stroke adjustment, 1 3/4 in.; depth of throat, 8 in.; die space with stroke down, adjustment up, 4 in.; size of bolster plate

July, 1935

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July, 1935

4 x 6 x 12 inches. Size of flywheel, 135 in.; speed of flywheel, 135 r.p.m. Weight from floor to center of shaft, 52 lb.; total weight, 710 pounds.

Bliss High Production Press

The announcement of an addition to the line of high speed automatic presses made by the E. W. Bliss Company, 400 Hastings St., Toledo, Ohio. The new machine has a width between housings of 48 in., adapting it to use of follow dies of considerable length. The press is regularly rated from 45 to 65 tons, depending upon the character and dura-

tion of the load. It is regularly arranged with a multiple speed or variable speed drive for operating speeds up to 250 or 300 strokes per minute for the non-gearred machine and up to 150 or 175 strokes per minute for the longer stroke geared machine for drawing operations of appreciable depth.

The use of heavy sections, special gilding of an extremely accurate type, the double crank construction with heavily ribbed crown and the shrunk tie rod frame contribute to obtaining record die life figures, which is an extremely valuable feature where expensive multiple

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PRODUCTION TOOLS

USED by more than 1600 manufacturers whose repeat orders prove that Apex Tools do increase production and decrease costs.

Quick Change Drill Chucks.
Morse Taper Collets.
Free Floating Tap Collets.
Straight Shank Drill Collets.
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Positive Drive Chucks.

Vertical Float Tapping Chucks
(Positive Drive)
Vertical Float Tapping Chucks
(Friction Drive)
Safety Friction Tapping Chucks.
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Semi Floating Tool Holders.
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Self Releasing Stud Setters.
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Universal Joint Socket Wrenches.
Screw Drivers.

▶ APEX S&H REAMERS ◀

S. & H. Reamers, formerly manufactured by the Schellenbach-Hunt Tool Company, Cincinnati, Ohio, since 1899, have won a reputation for workmanship and quality from thousands of users, some of whom have been continuous customers for more than 25 years. Purchased by Apex June 1st, 1935 and now manufactured in our factory at Dayton by the same skilled workmen who have been with the S. & H. Company for many years. Inquiries and orders from old and new customers are solicited. Prompt shipments.

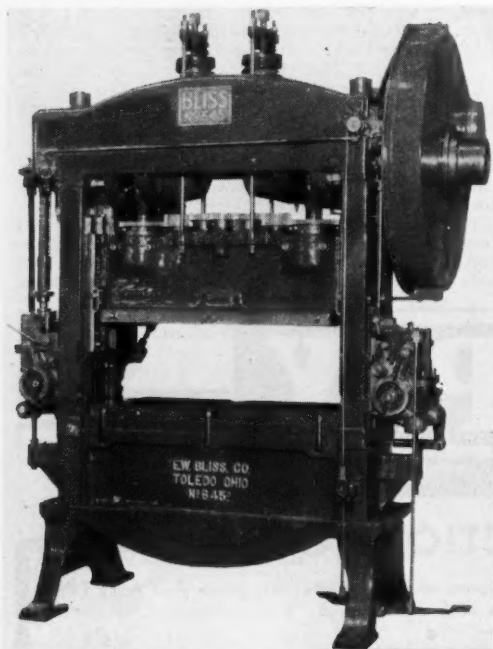
● Inserted Blade Machine Reamers
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Inserted Blade Shell Reamers
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MICRO-SET Helical Expansion Reamers

● Helical Chucking Reamers
"X-L" Spiral Shell Reamers, Adjustable
"X-L" Spiral Machine Reamers, Adjustable
Special Line Reamers

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THIRD AND MADISON STREETS, DAYTON, OHIO



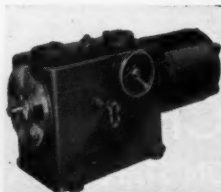
Bliss No. 645D High Production Press

operation tools are used. The equipment includes high speed type double roll feeds, substantial scrap shear with blade clearance adjustment, spring counterbalance for the slide, automatic force feed lubrication and a foot controlled starting mechanism which is essential for efficient production on strip-feeding and is an extremely convenient feature in starting and restarting of coil stock.

Vickers Hydraulic Variable-Speed Transmission

The illustration shows a hydraulic variable-speed transmission, now being built by Vickers, Incorporated, 1400 Oakman Blvd., Detroit, Mich., with which any desired

Vickers Hydraulic Variable-Speed Transmission

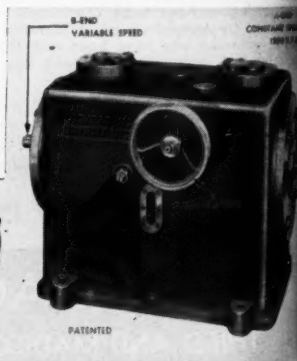


speed between 5 and 750 r.p.m. can be secured accurately, instantly, and smoothly simply by turning a hand-wheel. Additional adjustments permit speeds up to 2500 r.p.m. Hydraulic, mechanical, or electrical remote control can be substituted for the manual control shown.

The unit shown has a maximum output of 6 h.p. continuous duty at 1,000 lb. per sq. in., and $7\frac{1}{2}$ h.p. intermittent service at 1250 lb. per sq. in. Larger units will be available later.

The drive is a direct-connected 1200 r.p.m. motor, which is less expensive than slower speed motors; no belts, pulleys, or speed reducers are required. The power required is always at a minimum regardless of the load because the torque is automatically controlled and there is no throttling or bypassing of the oil. The end shafts can be provided for rotation in either direction, and the direction can be changed on the job without the necessity for extra parts. Units can also be provided with mechanism for instantaneous change of direction.

The unit is totally enclosed, thus no working parts or piping are exposed and the transmission is unaffected by moisture or dirt in the atmosphere. Overall dimensions of the unit shown are $25\frac{1}{2}$ x $17\frac{1}{2}$ x $17\frac{1}{2}$ in., but the dimensions can be varied to suit the individual requirements. Because oil is the fluid, the working parts are self-lubricating.



WHICH WILL YOU BUY?

First cost can be definitely known before purchase. Yet not only performance but absolute satisfaction can be definitely insured by this simple guarantee:

"This Tool Head may be returned to us at any time within one year for full and immediate refund, without question and regardless of usage."

Few words but they mean something. Out of the hundreds of Tool Heads that we have sold in the past four years not one has come back. And four out of five have displaced new or old types of wrench-adjusted heads—often recently purchased.

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ANY AND ALL TYPES OF "OFF-SET" OR "ECCENTRIC" BORING TOOLS WHICH ARE WRENCH-ADJUSTED AND REQUIRE THE MACHINE SHUT DOWN TO ADJUST THEM AND THEREFORE CANNOT BE USED FOR FACING, COUNTER-BORING, RECESSING, UNDERCUTTING, BACK-FACING, ETC.

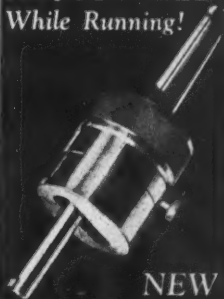
One size, super-accurate and compact, yet simple, rugged and powerful, displaces several sizes of wrench-adjusted heads as it handles every size and type of work from 1/16" to 16". Our heavy-duty head with No. 5 Morse shank for Horizontal Boring Mills will pass through anywhere that a 4" spindle will follow.

Pratt & Whitney Co. now recommend and furnish the Precision Universal for their new series of Jig Borers. For their earlier machines (except Models 1 and 1A) this equipment may be ordered from Pratt & Whitney Co. or from us. Its speed and accuracy make it absolutely indispensable.

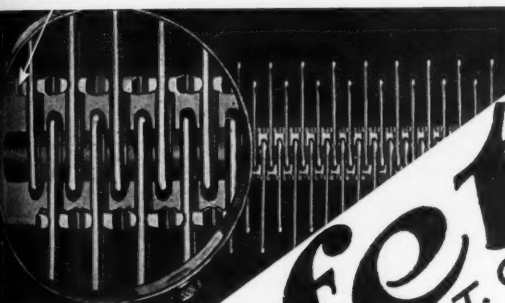
Send for bulletins showing difficult and unusual jobs done in unbelievably fast time with this truly Universal Tool Head.

THE PRECISION TOOL CO., BRIDGEPORT, CONN.

**ADJUSTABLE
While Running!**



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Absolutely Different**



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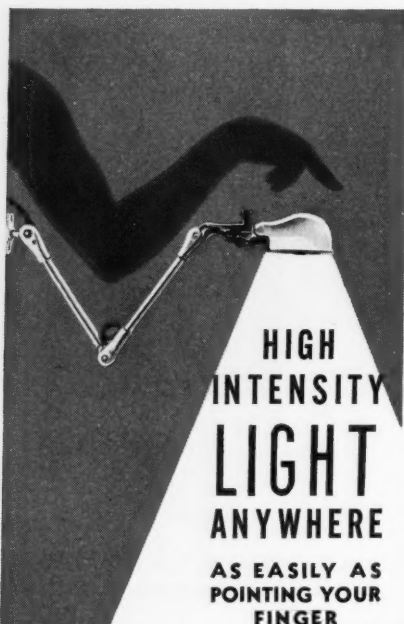
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Despatch Convected Air Tempering Furnace

Savings of upward of 50 per cent on operating costs, more uniformly heated parts, faster production, and smaller investment in tempering and drawing equipment are said to be possible as a

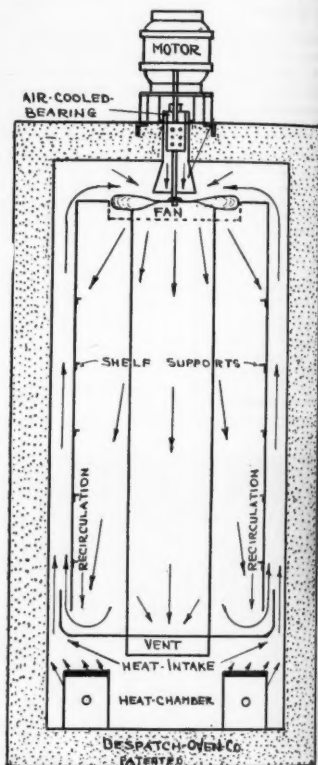


Fig. 1—Cross-section drawing of Despatch Convected Air Tempering Furnace, showing travel of air.

result of the development of the Despatch Types H and HT Convected Air Tempering Furnaces now being built by the Despatch Oven Company, 622 Ninth St., Minneapolis, Minn.

The furnaces are heated with gas, which in itself effects operating economies due to the low cost of the heat units applied to the work. Additional savings are made possible by the patented air circulating and recirculation

July, 1935
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ing arrangement illustrated in the drawing. Up to 80 per cent of the air may be recirculated, according to the manufacturer, maintaining a temperature within 5 degrees F. of uniformity. The range is from 300 to 1200 degrees F., which is applicable for tempering and drawing operations, heat treating after carburizing, normalizing and annealing to 1200 degrees F. maximum, ageing, bluing or browning of steel parts, nitriding, and so on.

Air is the heating medium. High capacity patented fan units force the heated air downward on the parts being processed with pressure and a high velocity swirling action, penetrating all parts of the furnace and the load. The use of specially-arranged baffles ensures that the travel of the air through the furnace will be positive and that the treatment of the work will be uniform. Up to four changes per minute are obtained in the working chamber of the furnace.

The furnace is simple in design, with no costly parts to be replaced at regular intervals. The heating system consists of a Surface Combustion Standard Atmospheric Gas Burner Equipment, which is supplied for natural, artificial, Butane, Propane, and Selas Gases. Ad-



Fig. 2—Despatch Type H Special Convected Air Furnace used for treatment of bi-metal elements and small metal parts, including dies.

justment is provided for high or low fire, providing the maximum of flexibil-

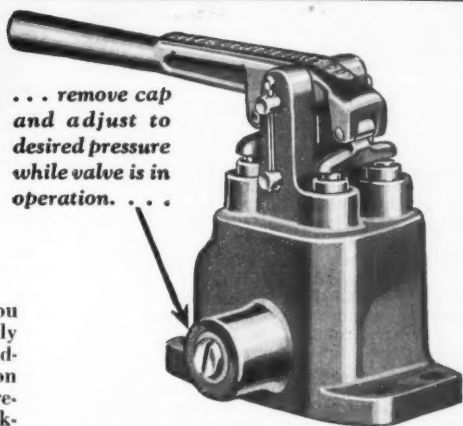
Ross Two - Pressure Valve



Provides air savings you can actually measure! Easily accessible adjustment lets you cut pressure on idling stroke to a minimum, retaining full line pressure on working stroke.

Put a "bridle on air horsepower!" Write today for new bulletin which gives all details.

... remove cap and adjust to desired pressure while valve is in operation. ...



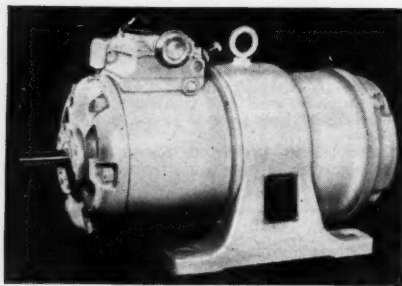
ROSS OPERATING VALVE CO.
6488 EPWORTH BLVD.
DETROIT MICHIGAN

ity in arranging for the proper temperature over the entire operating range. Overshoot in temperature is impossible. Tempering, drawing, or normalizing at a high rate of production is assured.

New Departure Variable Speed "Transitorq"

A variable speed power unit consisting of a constant speed electric motor built in as an integral unit with a transmission the output speed of which is infinitely adjustable over its entire range has been developed by The New Departure Manufacturing Company, Bristol, Connecticut. The unit is available with either a 1800, 1200, or 900 r.p.m. motor.

In the Transitorq, hardened steel roll-



New Departure Variable Speed "Transitorq"

ers in pressure contact with equally hard steel races are utilized to transmit power. An automatic pressure device is employed which utilizes the imposed torque load itself to generate the required pressure between the rollers and the races. So sensitive is this device to the slightest change in the imposed torque that the roller contact pressure is positively maintained under either continuous, variable or shock loads in a definite proportion to the transmitted load.

Because of this automatic control of contact pressure, the Transitorq guarantees a drive that is absolutely positive under all conditions, including extreme overload.

The rollers which transmit the drive from the constant speed input race to the variable speed output race are mounted in a non-rotatable spider. Each roller, being carried upon a ball bearing, is free to revolve about its own axis and in addition to this it may be rocked a limited distance about an

axis at right angles to it. As a result the rollers may be adjusted to any position relative to the races from the lowest to the highest speed ratio positions. It is obvious that in thus changing the position of the rollers with regard to the races, not only is the speed of the output race changed, but any speed within the limits of the low and high speed roller positions may be accurately obtained.

Since the contact pressure between rollers and races is automatically maintained in proportion to the imposed torque load, thereby assuring a positive transmission of power, it is obvious that the rollers cannot be forced from one ratio position to another no matter how slight a movement may be required. To accomplish this quickly and easily, the bearings supporting the rollers are designed to permit the rollers to be inclined slightly in such a manner as to alter their course upon the races. In this way, they roll themselves into the required ratio positions and the effort necessary to accomplish this, even with the Transitorq under full load, is no more than a finger touch on the wheel of the speed control.

The speed control mechanism mounted on the top of the Transitorq consists of two principal parts which, functioning separately or in conjunction with each other, give extreme flexibility in operation. The first part consists of an indicator dial supported on a circular, vertically disposed housing which is rotated by a worm gear either locally operated by means of a small hand wheel or by remote control. The second part consists of a rotor or vane within the circular housing and connected to a vertical shaft operating the roller shifting mechanism. At the start of the Transitorq, oil under pressure from the Transitorq pump enters the circular housing behind the vane and moves it around against spring pressure until it reaches a stop in the housing. The position of the stop depends upon the output speed indicated. With the Transitorq running the vane is kept in contact with the stop hydraulically and operation of the handwheel rotates both parts as a unit, increasing or decreasing the speed as desired.

Should the Transitorq be stopped when set for any speed between high and low, the oil pressure is immediately relieved and the vane automatically shifts back under spring pressure to the low speed starting position. The flexibility of this control, therefore, permits (1) The unit to be adjusted for any speed, either before or after start-

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A STRAIGHT-AHEAD RATCHET MOTION SPEEDS UP NUT TURNING

FAVORITE

Reversible Ratchet

WRENCH

Saves Time
in
Nut Turning



Repair and contract work, when time is a factor, can be speeded up as the wrench does not have to be removed from the nut at every turn.

Each head can turn two different-sized nuts—one size on each end. This cuts down the number of wrenches needed, and effects a saving in the cost of equipment. A slight movement of the handle turns the nut, a big advantage in cramped spaces. Socket form of head fits snugly over nut, preventing slippage and damage.

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METALLIZING

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Whatever the job . . . building up worn cylinder blocks, pistons, crankshafts . . . under-size bearings, journals . . . damaged glass-lined tanks . . . spraying babbitt metal.

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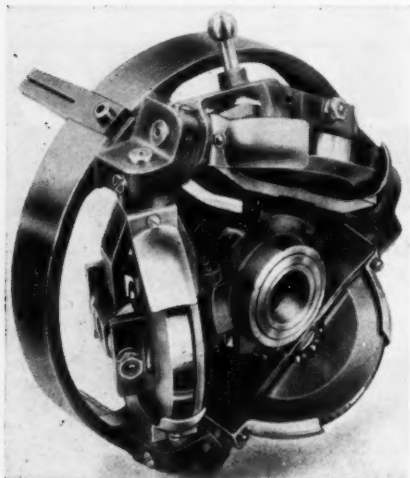


ing; (2) The unit to return automatically to the low speed-high torque starting position whenever the power is switched off; (3) The unit to shift automatically from low to a pre-selected speed.

By means of an adjustable valve accessibly located on the speed control, the time required for the unit to change from low to any pre-selected speed may be varied to suit requirements. With the valve full open, the unit will accelerate from low to highest speed or decelerate from high to low in three seconds.

The construction of the Transitorq and speed control is such as to accommodate a wide variety of mountings. The standard leg casting may be rotated to suit either floor, side wall, or ceiling installation. The speed control, always on top of the unit, may be rotated in a horizontal plane to give practically any desired angle of the speed control mechanism for either local or remote control. The Transitorq may be built in as a part of a machine by removing the legs and locating by the same flange and surfaces used to support the leg casting.

For installation in which the Transi-

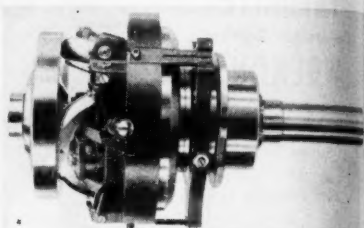


Non-Rotatable Spider in Which the Rollers That Transmit the Drive From the Constant Speed Input Race to the Variable Speed Output Race Are Mounted

torq is to be mounted within convenient reach of the machine operator, the speed control, located on the top of the unit, is fitted with a small handwheel which

can be rotated by a touch of the finger. Output speeds corresponding to the ratio changes obtained by movement of the handwheel are easily read on the dial of the control.

When the Transitorq is to be mounted beyond reach of the operator, the hand-



The Contact Pressure of the Rollers Upon the Races Is Automatically Regulated by This Device, Maintaining It Exactly in Proportion to the Imposed Torque Load

wheel on the speed control is removed to permit connection of a flexible shaft. A dial and handwheel at the other end of the shaft is then mounted so as to be within convenient reach on the driven machine.

On machines which require a variable speed drive with the speed changes occurring at irregular times, cam operation of the speed control may be applied. Variations in cam contour and speed being worked out to suit any conditions within the speed range and minimum shifting time of the Transitorq. Power required to drive such a cam is insignificant, a 1-1000 h.p. shaded pole motor being sufficient even with the Transitorq under full load. Where it is necessary for an operator to control one or more machines located at a distance, remote control is readily accomplished by electrical equipment.

The Transitorq is supplied in ten different sizes in horsepower capacity ranging from $\frac{1}{4}$ to 20 horse power.

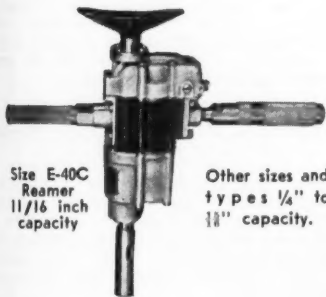
Milligan & Wright Floor Model Blueprinter

A new model of the Angstrom Lamp Blueprinter is announced by Milligan & Wright Co., 4618 Prospect Ave., Cleveland, Ohio. This one is a floor model with a novel arrangement for the washing and fixing trays and drying boards provided in the base. The photograph shows these trays extended into use. They can then be slid back into



REAMING

The Rotor motor gives uniform high load speed, free from vibration. The automatic governor control gives proper speed and increases reamer life.



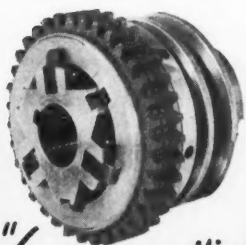
Size E-40C
Reamer
11/16 inch
capacity

Other sizes and
types 1/4" to
1 1/2" capacity.

Send for Catalogue

The Rotor Air Tool Company

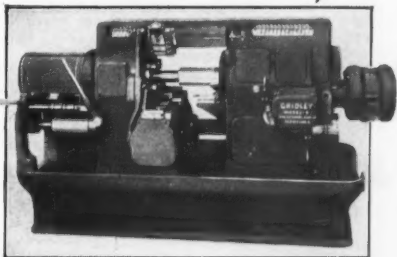
5600 Carnegie Ave., Cleveland, Ohio



*"Extremely positive
AND Quick acting"*

The National Acme Co., Cleveland, uses Twin Disc Clutches on their Gridley Screw Machines—for application to threading attachment where it is necessary to secure a different speed and in the case of tapping to back out the tap . . . on the shaft for controlling the high and low speed of the machine . . . and for what they term a safety clutch. Here are their reasons why—"because we found that the Twin Disc Clutch was extremely positive, quick acting, and in our judgment suited the purpose better than anything we have been able to locate on the market. It has been eminently satisfactory in the application to our machines and we are delighted with its performance." Write for specific recommendations. Engineering data on request.

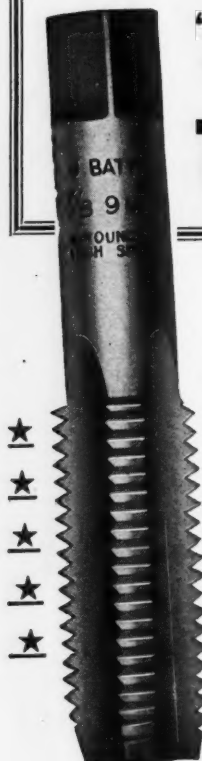
*Twin Disc Clutch Company,
1326 Racine St., Racine, Wis.*



There's a **SWING** to

"GROUND from
THE SOLID"

TAPS



Precision Thread Form

Stronger Cutting Edge

Uniform Hardness

Accurate Lead

Correct Angle

Your biggest money's worth in taps is the "Ground from the solid—after hardening." When hardening is done BEFORE thread grinding, fine threads are accurate, cutting edges stay sharp. You get more—and more satisfactory—production per tap, if you standardize on BATH.

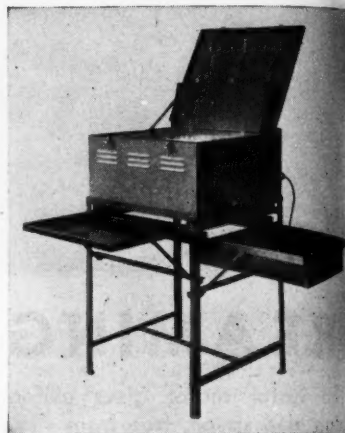
Get The Facts In Our
Interesting Booklet

JOHN BATH & CO., Inc.

WORCESTER, MASS.

the base so that the floor space required is only 28x30 inches.

The use of an incandescent lamp for blueprinting has long been recognized as the means of utilizing simple inexpensive equipment, capable of being plugged into any 110 volt A.C. or D.C. light socket, but heretofore the long exposure required made it impractical. This equipment produces prints with



Milligan & Wright Floor Model Blueprinting Machine

exposures of $\frac{3}{4}$ to $1\frac{1}{2}$ minutes depending upon the drawing and paper used. The time switch which cuts off the current at the end of the exposure further simplifies the operation. Model 200 has a capacity of one 18x24-inch or several smaller prints at one time.

Ingersoll Zee Lock Side Milling Cutters

The new Ingersoll Zee Lock Cutter Blade recently introduced by the Ingersoll Milling Machine Co., Rockford, Ill., has now been applied to inserted blade side milling cutters. Securely retained in the cutter housing by a z-shaped wedge, which hooks the front of the cutter body and the back of the blade, it is impossible for the blade to shift backwards or inwards away from the cut. The back hook of the wedge is on a slant so that when the cutter blade is reinserted and moved out a serration it moves forward a slight amount, compensating for the slight amount of wear on the face of the cutter. No additional parts or shims are required for resetting

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Lock

Ingersoll

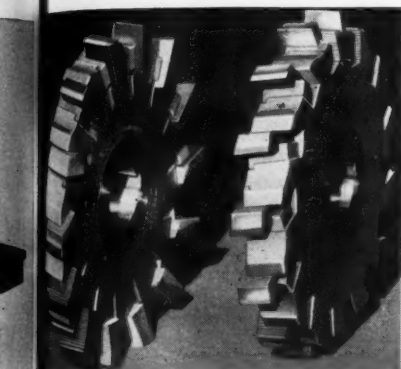
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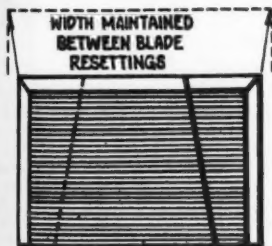
The blade is adjustable in proper proportional directions of wear. The wedge in the locking member and is not disturbed by the thrust of the cut as this is absorbed by the serrations. The serrations further increase the area of frictional contact for locking.

Half side milling cutters, made right or left hand as shown, incorporate the Lock cutter blade. Staggered tooth



Ingersoll Zee Lock Side Milling Cutters

alternate angle cutters, used for slotting or keyway operations, may be readily resized for width, as the alternate Zee Lock cutter blades move axially when adjusted radially for wear, as shown on the accompanying line drawing. Plain side and interlocking cutters

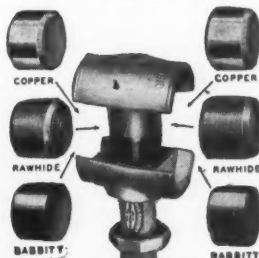


Drawing showing method of locking Zee Lock cutter blade.

With plain wedge locks are also offered. Cutters are made as small as four inches diameter by one half inch wide.

The replacement cost of a new set of blades is considerably less than the cost of a new cutter, even if made solid. In the larger cutters, over seven inches

NO DAMAGE . . . To Finished Surfaces



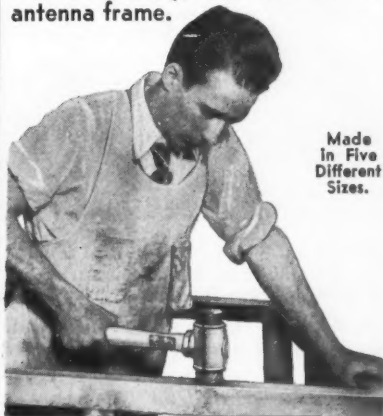
A Hammer that will strike blows of varying hardness without marring the surface.

The Rawhide, Copper and Babbitt Faces make it possible to adapt this Hammer to any class of work.

BASA

A soft-faced hammer of improved design and construction.

Illustration shows Basa being used in RCA Victor plant on transmitter antenna frame.



Made in Five Different Sizes.

Send for Full Particulars
GREENE, TWEED & CO.
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109 Duane St.

New York

diameter, the inserted cutter is even cheaper in initial cost than the solid. Inserted blade cutters generally offer superior cutting advantages as the small inserted blade cutters are easier to heat treat than the solid. The cutter housings of Ingersoll Zee Lock cutters are made of forged and heat treated chrome molybdenum alloy steel, which is tough and strong.

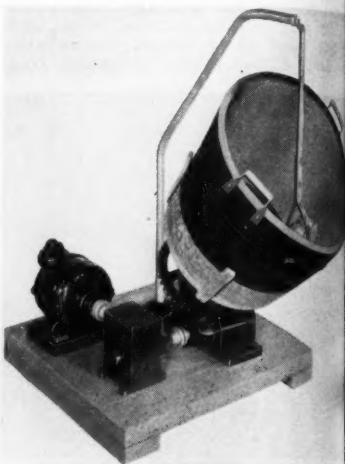
All Ingersoll side milling cutters are made to the American milling cutter standards. They are furnished with cutter blades of specially selected forged, hardened and ground high speed steel, or super-cobalt high speed steel; also with cutter blades of "J" Metal Stellite or tipped with cemented carbide. All Ingersoll Zee Lock cutter blades are of standardized dimensions so that when blades of corresponding thickness are worn in a larger cutter, they may be transferred to a smaller cutter.

Udylite "Handiplater"

The illustration shows a small, inexpensive plating unit of simple design, intended for use in plating occasional small lots of work or for the production plating of very small parts. This unit, called the "Handiplater", has been placed on the market by The Udylite Company,

1651 East Grand Blvd., Detroit, Mich.

The capacity of the work cylinder up to 25 pounds. The cylinder is detachable, which makes possible the use of any plating solution in the same cylinder. By rinsing the cylinder well



Udylite "Handiplater"

tween plating operations, the same cylinder can be used for cadmium, copper or other plating solutions, or for drying or tumbling.

The unit is powered by a 1/8-hp. motor, which can be plugged into a light socket. Sturdy and compact, the Handiplater takes up but little room and can easily be placed out of the way when not in use.

"Spra-Bonderizing"

Supplementing their well-known immersion Bonderizing process, the Rust-Proof Company, 2204 East Milwaukee Ave., Detroit, Mich., is announcing a new method of application called "Spra-Bonderizing".

Heretofore, Bonderizing was always accomplished by the immersion method in still tanks, either by submerging articles to be processed through a solution tank on a conveyor, which requires from two to five minutes in the solution depending on the nature of the article being treated.

Spra-Bonderizing chemically produces a typical rust-resistant phosphate coating that provides an adherent base



● 11¼ in. Swing . . . Two bed lengths . . . 24 and 36 in. center distances . . . 1 1/16 in. Spindle Hole.

Semi-quick change gear box with gears for cutting 4 to 80 threads per inch.

Ask for Bulletin No. 23.

Sheldon Machine Co.

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Now you can get GORHAM Ground Tool Bits and Turning Tools by the box from your local jobber. GORHAM Tool Bits are accurately ground and are expertly made by cutting tool specialists. They give more satisfactory results.

These Tool Bits are available in three distinctive cutting Materials . . . GORHAM Standard to cover the commercial field, GORHAM Imperial to cover the field of heavy cuts in hard material, and GOR-MET for the more abrasive materials.

Order from your dealer or write us direct for new circular giving prices.

GORHAM TOOL COMPANY

14400 Woodrow Wilson Ave.
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For Safer and Faster Tapping

With a WIZARD Quick-Change Chuck in the drill press spindle and WIZARD Friction-Drive Tapping Collets for his taps the operator can go full speed to the bottom of blind holes. The WIZARD friction drive protects the tap. When the tap bottoms or meets an obstruction, it stops while the chuck and spindle continue to revolve . . . With a complete WIZARD Outfit, drilling, reaming, and tapping become a continuous operation. The operator changes tools with one hand without stopping or slowing the spindle. Bulletin 14-B gives full details. Send for a copy.

McCrosky Tool Corp., Meadville, Pa.

WIZARD Quick-Change Chucks



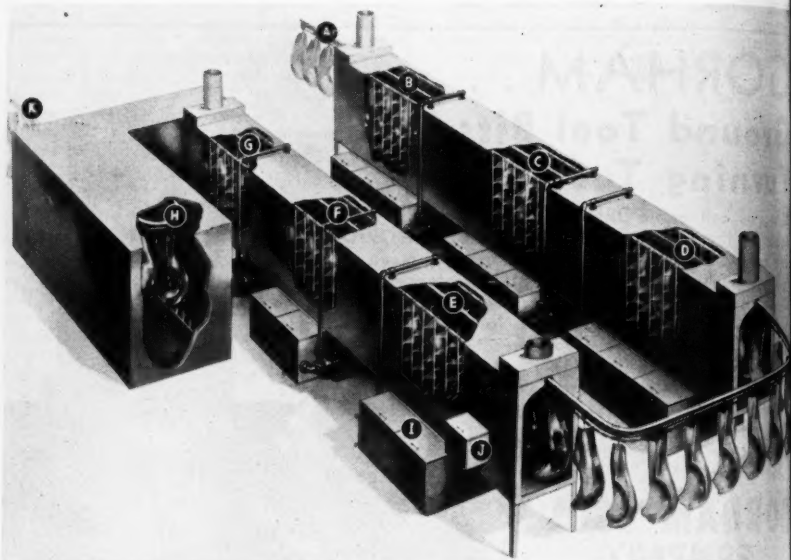


Illustration shows the complete Spra-Bonderizing process from cleaning to drying. A—Production Entering Cleaning Section. B—Alkaline Cleaning. C—Rinse. D—Rinse. E—Spray Bonderizing Section. F—Clear Water Rinse. G—Acidified Rinse. H—Drying Oven. I—Tank for Spraying Bonderizing solution. J—Tank for replenishing of Spraying Bonderizing solution. K—Bonderized Production Leaving the Drying Oven Ready for Final Finish.

paint, enamel or lacquer. The process is accomplished by spraying the processing solution onto the production as it passes through the Bonderizing section of a completely mechanized conveyor line, including cleaning, Bonderizing, rinsing and drying.

The new process makes possible the production of phosphate coatings at lower temperatures and lower chemical concentration than has ever been possible by an immersion process. The pressure spraying accelerates the chemical reaction and produces both a cleaning and coating action in one operation. Processing time has been reduced to sixty seconds as against two to five minutes by immersion.

Due to shortened processing time, equipment requirements are minimized, steam requirements are lower, less floor space is needed, and by recirculating the solution, it is possible to process a given amount of work with a smaller volume of solution.

As the work progresses on the conveyor line through the various steps of cleaning, Spra-Bonderizing and rinsing, it passes a series of small standpipe

sprays which force the solution against the material from every conceivable angle, flooding all areas to be treated. The equipment is assembled in a steel housing with reservoirs below, where solutions are accumulated, ready for recirculation. All pumps, valves, pipe, tanks, motors and similar equipment are standard and need not be produced from expensive alloys.

Armstrong Now Marketing "Ideal" Line of Chain Tongs

Armstrong Bros. Tool Co., 328 N. Francisco Ave., Chicago, Ill., has taken over the complete line of "Ideal" chain tongs formerly marketed by the Carrier Engineering Corporation. In taking over the line, Armstrong Bros. the name "Ideal" is retained. The complete line is now carried in stock and immediate delivery can be made on orders.

The feature of the "Ideal" chain tongs consists in that the jaws are made with double-angle teeth, straight teeth for gripping pipe, and teeth cut at an angle for gripping fittings. The jaws are drop

DEP

The Uni

FOOT PRE
for 2" hole
holes per r

No. 10 P
1/4" hole
Weight 8

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OF FORB

DEPENDABLE DRILL HEADS

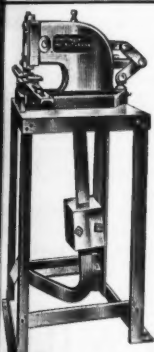


When you apply United States Drill Heads to your drilling machines for multiple operations, you can always depend on them to do a good job. Drill Heads designed to meet your individual requirements.

Send your blue prints for estimates.

The United States Drill Head Co.

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CINCINNATI, OHIO



**ANGLE IRON
SHEAR No. 4**

Capacity
2x2x 1/4"
Angle Iron
Weight
44 lbs.

**ASK FOR
CATALOG
No. 9**

FOOT PRESS No. 28—Capacity
2" hole in 16 gauge—100
holes per minute.



No. 10 PUNCH—Capacity,
1/4" hole through 1/4" iron.
Weight 8 1/2 lbs.

**80 ITEMS
FROM WHICH
TO CHOOSE**

WHITNEY METAL TOOL CO.
31 FORBES ST. ROCKFORD, ILL.

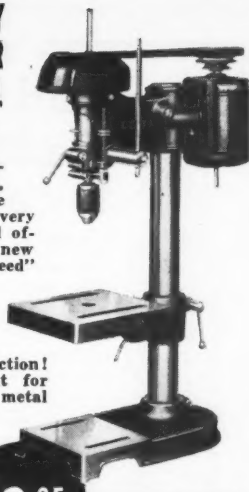
CUT PRODUCTION COSTS *with* **DELTA** DRILL PRESSES

QUALITY TOOLS FOR ALL METAL DRILLING

Quality accuracy, convenience, and unusual value—that is what every Delta quality tool offers you. The new Delta "Slo-Speed" Drill presses, priced as low as \$29.85 for the bench model, are a revelation in action! They are efficient for all types of metal drilling—in factories, machine shops, garages, and service stations. Their range of speeds enable them to be used in any general shop with drills from No. 60 up to 17/32" with utmost efficiency.

Speeds 390, 745,
1280, 2050 R.P.M.

Any of the three "Slo-Speed" models, bench or floor type, can be supplied with "Delta-Grip" Chuck, Jacobs Chuck, Tapping Attachment or Spindle for No. 1 Morse taper shanks. Floor model may be fitted with special production table. Write for full details about "Slo-Speed" Drill presses and name of nearest dealer.



\$29.85

Model No. 1295
Bench Type Delta
"Slo-Speed" Drill
Press, with Delta-
Grip chuck, motor
bracket, motor
pulley and belt,
but without motor
..... \$29.85

DELTA MFG. CO.

603 EAST VIENNA AVE.
MILWAUKEE, WISC.

THE SIGN OF GOOD GEARS



ALL TYPES . . . ALL MATERIALS

Good Gears . . . of any material . . . quickly and accurately made to any specification . . . that's what you can depend upon when you come to **DIEFENDORF** for your gear requirements.

Quotations gladly furnished

DIEFENDORF GEAR CORPORATION
Syracuse, New York

Diamond Radii Dressers



HERE is a 45° angle lapped radius point. This tool, together with many different types of natural pointed radius diamond pointed tools, offered at prices ranging from

\$2.50 UP

depending on size of stone.

Write for prices covering your particular needs.

WHEEL TRUEING TOOL CO., INC.
13931 OAKLAND AVE., DETROIT, MICH.

forged from high grade tool steel, and are easily sharpened when necessary. All slack of chain is taken up between the chain support and the front of the jaws, and the radius of the biting surface enables the operator to obtain the maximum of grip. All parts are interchangeable and repairs are quickly and easily made. The chain is of the best tested quality and is held by a loose removable pin made of special tool steel. The handles are forged from spring steel selected to give the required stiffness.

"Ideal" Chain

"Quality" Self-Contained Metal Marking Machines

The Quality Die Company, 93rd and Baltimore Ave., South Chicago, Ill., announced two new type machines for the marking of metal and metal products. One machine contains all the letters of the alphabet and the numerical digits 1 to 0 on a single wheel. A single character is impressed at a time, but simply turning the wheel, any combination of figures and letters may be stamped. Accuracy in stamping is secured by a guide opening in the face of the machine, through which appears duplicate of the character to be stamped. Grooves in the base of the machine serve as guides for the placement and aligning of characters on the surface to be stamped.

The second machine (illustration) is a multiple wheel machine. It is supplied with any number of wheels from 2 to 9 or more, and each wheel contains

WEL-DON DOUBLE-END MILLS

For Fast, Accurate Die Cutting

• Spiral Hollow-Ground Flutes give clean shearing cut, and eject the chips freely. Double Backoff assures stronger cutting edge—longer life—heavier feeds.



**HIGHEST SPEEDS
FASTEST FEEDS**

Write for 48-page catalog

THE WELDON TOOL CO., 319 FRANKFORT AVE., CLEVELAND, OHIO



FULL
Piston
Type

THIS val
In pipe
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suitable for
over 10 lbs
Adjust
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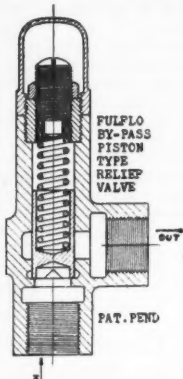
Fulflo
BLANCHES



For ove
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FULFLO Non-Chattering By Pass Piston Type Relief Valve

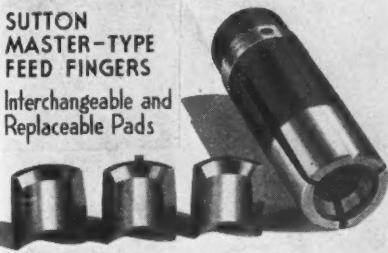
THIS valve is made in pipe sizes from $\frac{1}{4}$ " to 3" and is suitable for pressures from 10 lbs. to 1,000 lbs. Adjustment can be made by removing cap and turning adjustment screw at top of valve. The cylindrical piston seat closes off the port in shearing manner, and does not seat abruptly against the body of the valve, thereby, relieving a pounding or chattering noise as ordinarily caused by standard valves using a disc seat.



Fulflo Specialties Co., Inc.
LANCHESTER OHIO

SUTTON MASTER-TYPE FEED FINGERS

Interchangeable and
Replaceable Pads



FINGERS THAT SAVE

On both original cost and upkeep of chucking equipment for screw machines. One Sutton Master-Finger with different sets of pads will handle practically the full range of one machine. Pads are interchangeable in masters for different makes of machines of the same machine size. Hole size of worn pads can be restored many times before replacing. Catalog No. 11 gives full details of the exclusive advantages of these master fingers and also of the complete Sutton line of collets and screw machine accessories. Send for a copy.

SUTTON TOOL COMPANY

2840 W. Grand Blvd., Detroit, Mich.



If you use Fibre Parts,
we can save you
Time, Trouble
and Money...
and if you don't,
we might suggest
a use that will
help to cut your
production costs.

For over 30 years we've specialized in making fibre and machining it into parts. Because we have standardized and have the necessary equipment, we can economically turn out fibre parts in any shape and quantity. For many manufacturers we have been able to save time, expense and worry. Maybe we can do it for you. Write for our latest catalog.

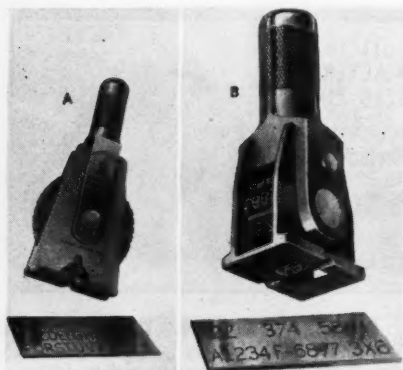
"Wilmington Fibre"

WILMINGTON FIBRE SPECIALTY COMPANY

PIONEERS IN FIBRE FABRICATION



WILMINGTON, DELAWARE



"Quality" Self-Contained Metal-Marking Machines

10, 12, or 14 characters, either figures or letters or both as desired. By turning the wheels, the characters, as they are to be impressed, can be arranged in a single straight line in any combination. Special characters can be engraved to order.

Grooves cut into the face of the wheels

between the deeply engraved character fit over a small pin which insures perfect alignment and acts as a reinforcement to the large shaft pin. Characters are kept in alignment by means of ratchets for each wheel. A guide plate enables the user to place the impression just where he wants it and makes possible a uniform impression of all characters.

In both the single wheel machine and the multiple wheel, the shank tool moves downward when marking through the base guide and goes back into position automatically after the impression is made.

Both machines are made of special hardened and tempered tool steel guaranteed by the manufacturers to press metals up to and including Brinell Hardness No. 415. They would be equally as effective on fibre, leather, wood or any material that needs identification number or letter.

Clipper No. 0 Vise Belt Lacer

The Clipper Belt Lacer Company, Grand Rapids, Mich., has brought out a new model of belt lacer, in 4-inch and 6-inch sizes, for use in connection with an ordinary bench vise. With this



M-D Facing Heads With Automatic Feed

Can be attached to Column Boring Bar, and Drilling or Milling Machine spindles. Single point tool travels radially, from center outward or reverse, feeds automatically, and covers faces 6" to 30".

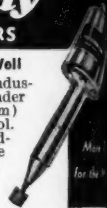
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SpeedWay GRINDERS

Does a Hundred Jobs Well

Priced low, still built to industrial standards. 123 Grinder is a lighter, (all aluminum) handier, hand or lathe tool. Universal Motors take grinding wheels to 1 1/4". In case with collet, wrench and three wheels.



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NATIONAL Tool Salvage Service will save you approximately

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on Milling Cutters, Drills and Reamers.

NATIONAL TOOL SALVAGE COMPANY

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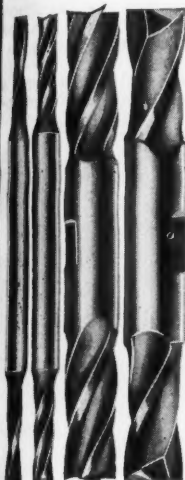
July, 1935

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SHEAR CUT Single and Double END MILLS

THEY shear cut the metal instead of the old way of cutting. They leave that smooth finish you want. It is the way they are ground. Give them a trial and see for yourself. You get two for the price of one.

Send for a new catalog showing other sizes and styles.

PROGRESSIVE TOOL & CUTTER CO.
FERDALE MICHIGAN

PRECISION TAPPING

with the New

"PROCUNIER"

HIGH SPEED, BALL BEARING
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**Smoother--More
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Double - Cone, Long Life,
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Three Sizes With
Capacity up to
1/2" in Steel.

Also other Styles and
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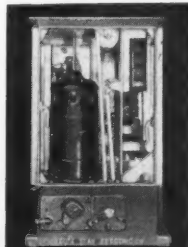
PROCUNIER SAFETY CHUCK CO.
12 SO. CLINTON ST. CHICAGO, ILL.



Record Breaking Switches

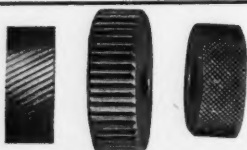
POWERED BY MASTER MOTORS

This is just one terminal of the mammoth 3 pole, 287,000 volt Delta Star disconnect switches to be used on record breaking Boulder Dam. Sixteen such 15-ton, \$10,000 switches will be installed on the 240,000 KW, 270 mile transmission line from Boulder Dam to Los Angeles. Specially constructed reversible Master Guaranteed Motors with integrally built multi-disc, Uni-brakes, operate these



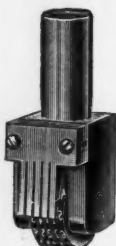
switches. Where absolute dependability is required in a motor designed to your particular needs, you too should let Master Engineers help you select the motor best suited to your requirements.

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KNURLS**123 Styles
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Highest quality, accurately cut Standard Stock Knurls ready for immediate shipment. Reed Special Finishing Process after hardening insures longest wearing Knurls producing best work. Special Knurls made to specification. Send for Circular.

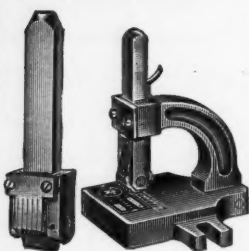
REED SMALL TOOL WORKS,
40 DEWEY STREET, WORCESTER, MASS.

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with a NUMBERALL**

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Steel Stamps,
Trade Mark
Stamps, etc.

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Circular and
Prices.

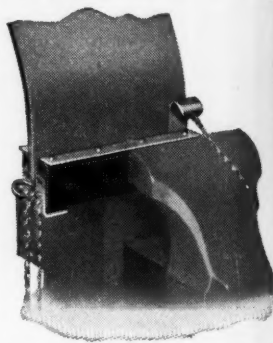
Made with 1 to 8 wheels.
Stamp in perfect alignment.
Shank for Hand or Press
Stamping. Platform for
stamping Name Plates and
other small articles.

**Numberall Stamp & Tool Co.**

Huguenot Park, Staten Island, N. Y.

using a pressure plate which is part of the lacer, it is said that it is now possible to make as satisfactory a Clipper joint in a belt by using a bench vise as with the most powerful lacing machine built.

The manufacturer states that only a few minutes are required to embed the



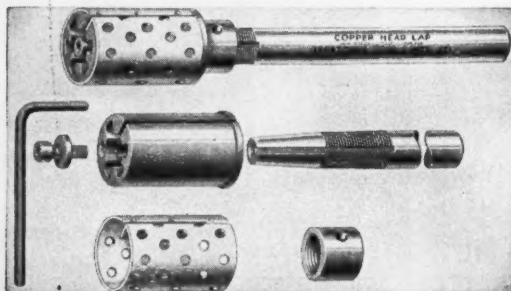
Clipper No. 0 Vise Belt Lacer

hooks flush with the surface of the belt, and a 4-inch or 6-inch belt up to $\frac{1}{4}$ inch thick can be laced in one operation.

The Clipper No. 0 Vise Lacer is made of case hardened steel and flat strip steel which is cadmium-plated. The lacer which holds the hooks is of brass, and the pressure plate is of spring steel. This plate is used when the vise is not powerful enough to imbed all the hooks at once.

Mauser Convertible Height Gage

A new and improved type of Convertible Height Gage has recently been added to the line of Precision Mausier Tools which is handled in this country by the George Scherr Company, 130

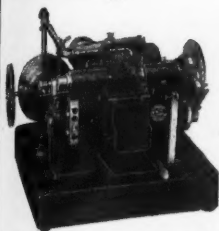
**LOWER YOUR
LAPPING COSTS**

with Groetchen Copper Head Expansion Laps. Profitably used in hundreds of leading shops. Available in sizes from $\frac{1}{8}$ " to 2 $\frac{1}{2}$ ", graduated by sixteenths of an inch. Many other designs for special applications.

Write for Bulletin C 40
GROETCHEN TOOL & MFG. CO.

124 N. UNION ST., CHICAGO, ILL.

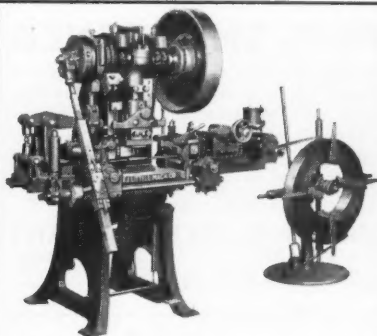
"Waltham" Pinion Cutting Machines



**FAST
AND
ACCURATE**

Operator can attend to several machines. For small pinions, a magazine feed not shown in the cut allows the machine to run without stopping, materially increasing the production. One, two, or three cuts, according to the nature of the work, may be made.

**Waltham Machine Works
WALTHAM, MASS.**



40,000 Blanks A Day

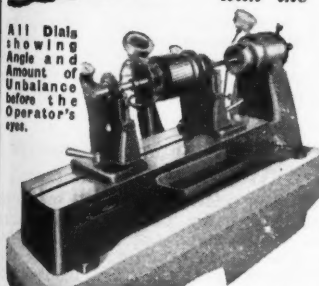
—That is the production which is being obtained in 8 hours on this press running 125 r.p.m. and equipped with a No. 3 Littell Feed.

**F. J. LITTELL MACHINE
COMPANY**

4127 Ravenswood Ave., Chicago
Manufacturers of Punch Press Feeds and Reels.

Eliminate VIBRATION

with the



**New Super-Sensitive Neon-Lite
Machine**

Notice Rugged Design and Construction—
These Machines are Built to Stay in Pro-
duction—They Will Stand Years of Service
Twenty-four Hours a Day.

NEW GLOBE SUPER-SENSITIVE DYNAMIC BALANCING MACHINE

These machines are now balancing armatures, rotors, fans, pump impellers, crankshafts, automobile universal-joint drive shafts, flywheels, and many other parts.

**AUTOMATIC and SEMI-AUTOMATIC
ARMATURE and COIL WINDING
MACHINERY, SPECIAL WIRE
SKINNING and INSULATION
FORMING MACHINERY FOR
ELECTRICAL MANUFACTURERS**

Our engineering department will gladly recommend proper equipment for your problem.

**THE GLOBE TOOL &
ENGINEERING COMPANY**

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DAYTON, OHIO

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Quality files can be satisfactorily renewed from 3 to 5 times. Tremendous savings (50% to 75%) are being obtained by many manufacturers using our service. Original temper left in file.

Send in an old file. We'll sharpen it at no charge to demonstrate our service.

NATIONAL FILE COMPANY
514 ERIE ST. LANSING, MICH.



2, 3 & 4-way VALVES

For use on air, water, steam or oil for operating single and double acting cylinders, on pressures up to 300 lbs. Made in Lever, Foot and Solenoid Operated types.

Bulletins on request.

W. H. NICHOLSON & CO.
136 Oregon St., Wilkes-Barre, Pa.

Anderson Improved Balancing Ways No Leveling Required

A simple and excellent device for balancing straightening and truing.

They are made in the following sizes:

Swing	Greatest Distance Between Standards	Capacity in lbs.
20 in.	20 in.	1,000
40 in.	30 in.	2,000
60 in.	30 in.	2,000
72 in.	66 in.	5,000
96 in.	88 in.	10,000



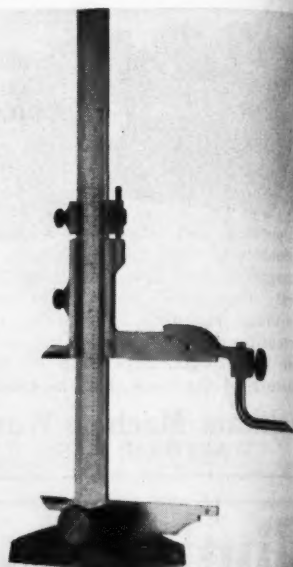
Four Chilled iron discs rotate on sensitive special bearings

Write for Full Information.

Mfg. By Anderson Bros. Mfg. Co.
1926 Kishwaukee St., Rockford, Ill.

Lafayette St., New York, N. Y.

The tool consists of a toolmaker's caliper of standard Mauser make which is now available with knife edge point at the rear of the jaws. For use as height gage, a substantial lapped base



Mauser Convertible Height Gage

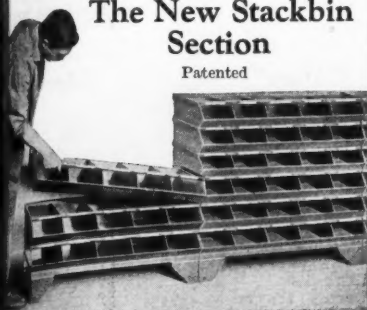
furnished in which the caliper is located and held by a centering clamp. The scriber readily attaches to the upper jaw. The scribing needle is of angular design and adjustable in such a way that proper setting of the scriber will result in direct reading of the verniers. Verniers are provided for reading 0.001 inch and 1/128 inch respectively.

Brown-Brockmeyer Bench-type Grinding Machine

A grinding machine of the bench type designed to carry two 6-inch grinding wheels as shown in the illustration, has been placed on the market by the Brown-Brockmeyer Co., Inc., 1000 Smithville Road, Dayton, Ohio. Available in 1/4 h.p. and 1/3 h.p. sizes, the unit is equipped with the company's motor mounted on ball bearings. The bearings and motor are enclosed in a dust-proof housing. Wheel guards extend from both sides of the motor frame and

The New Stackbin Section

Patented



MAKES A STOCKROOM AS EASY TO BUILD AS A SECTIONAL BOOKCASE

The Stackbin Section is designed so that one section-nests-into-the-other, and sections nest deeply enough so that several placed one on top of the other provide a substantial unit. Ideal for temporary stockrooms near the job. Base separate. Counter top can be supplied. Write for circular and prices.

STACKBIN CORPORATION

TROY ST.

PROVIDENCE, R. I.



• NEW An Inexpensive ABRASIVE BAND GRINDER . . .

"Built Like a Machine Tool"

The Hormel-M Grinder is sturdily built with a supporting leg under the grinding table to eliminate vibration and tipping due to pressure on the belt. Ball bearing throughout, equipped with **ALEMITE LUBRICATION**, complete with grease gun.

Write for illustrated folder on this and other styles and sizes.

HORMEL-M GRINDER

WALLS SALES CORP.

96 WARREN ST.

NEW YORK, N. Y.

UNUSUAL and DIFFICULT GEAR JOBS CUT QUICKLY and ECONOMICALLY

This gear component, consisting of a shaft having integral with it two herringbone pinions and one spur pinion, is one example of the many different classes of gear cutting work produced at our Buffalo plant.

Besides the famous Farrel-Sykes continuous tooth herringbone gear we make gears of all types that operate on parallel axes in any size from $\frac{1}{4}$ -inch to 22-feet diameter. Our staff of engineers, with many years of experience in the design, manufacture and operation of gears, will gladly give you unbiased, expert recommendations on any gear application.

FARREL-BIRMINGHAM COMPANY, Inc.

381 Vulcan St., Buffalo, N. Y.

FARREL-SYKES *"The Gear With a Backbone"*



are fitted with end plates as shown.

The base of the machine is fitted with rubber pads, and a handle is included



Brown-Brockmeyer Bench-Type Grinding Machine

for carrying the grinder when it is to be transported from one position to another. The handle lies out of the way when not in use. Both sizes of the


machine are intended for use on a 110 volt, 60-cycle circuit, and operate at a speed of 3,450 r.p.m.

"Alnor" Horizontal Edgewise Pyrometer

The illustration shows the "Alnor" Horizontal Edgewise Pyrometer which has been developed by the Illinois Testing Laboratories, Inc., 146 W. Austin Ave., Chicago, Ill. The construction of the instrument is such that it may easily be mounted on a wall, post, panel or switchboard, or directly on the engine if necessary. The connecting wires between thermo-couples and selector switch may be installed in any convenient manner and enclosed in a conduit if desired.

The indicator is ruggedly constructed to withstand severe vibrations, jars, or shocks. Perfect damping of the moving element prevents the pointer from over swinging or oscillating even under heavy shocks. Permanence of accuracy is said to be assured by the simplicity of design, high torque, high quality of materials, and careful workmanship.


The long 6-inch scale with its legible markings, fine pointer, and mirror white



PANT

RIVETERS—PIONEERS in their line—Head rivets from 1/4" to 1 1/2" diameter. Other sizes. **NOISELESS SPINNING** of bolts. **VIBRATING HAMMER** methods—Sizes to meet all needs. Types include Vertical and Horizontal Multiple Spindles.

Write for literature—and don't forget to send samples.



THE GRANT MFG. & MACHINE CO.
96 Stillman Avenue
BRIDGEPORT, CONN.

SHORT RUN STAMPINGS

A process eliminating necessity of making expensive dies.

ALSO PRODUCTION STAMPINGS

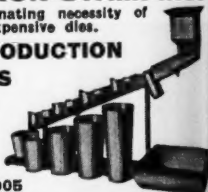
We specialize in building mechanical devices. Write for estimates.

Established 1905

GERDING BROS.

5 E. THIRD ST.

CINCINNATI, O.



EVERY SHOP needs these rugged, accurate, portable Pyrometers. L88 for checking Surface Temperatures: 800° range with 1 ft. silver tip couple, \$17.90. L89 for Non-ferrous Metals: 1600° range with 2 ft. couple and 1 ft. replaceable tip, \$19.30. L90 for Furnaces: 2500° range with 3 ft. couple, \$19.00. Sent on 30-Day Trial. Circular Free.

RUSSELL ELECTRIC CO.
338 W. Huron St., Chicago

Hold-Heat Pyrometers



\$16
COMPLETE
EXTRA

BAL
ROL
JOU
Spec
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TH
358

MENDES QUALITY DIAMONDS *Always Sharp*



REDUCE
GRINDING
COSTS



FOLDER
M
ON REQUEST

Mendes Cutting Factories, Inc.

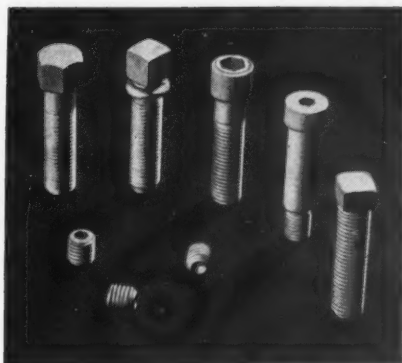
DIAMONDS AND DIAMOND TOOLS
505 Fifth Avenue, New York, N. Y.
Rep.: Milwaukee, Indianapolis, Cincinnati,
Pittsburgh, Baltimore

THE ORIGINAL

Mac-it

PRONOUNCED
"MACK-IT"

IDEA



● STRENGTH

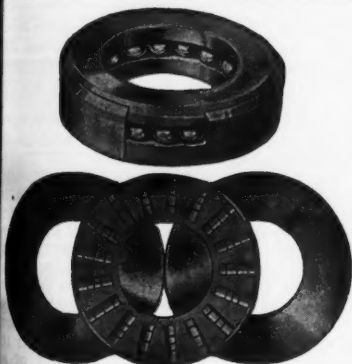
Twenty-five years ago, the makers of MAC-ITS realized that industry needed STRONGER SCREWS.

Like the chain that is only as strong as its weakest link, so the industrial machine depends for sound performance upon its smallest parts.

To make "the strongest screw products in the world." THAT was the original MAC-IT idea—an idea which goes far to explain the part which MAC-ITS play in the throbbing drama of automatic machine production.

THE STRONG-CARLISLE and HAMMOND CO.

CLEVELAND, OHIO . . . NATIONAL DISTRIBUTORS



BALL THRUST BEARINGS ROLLER THRUST BEARINGS JOURNAL ROLLER BEARINGS

Special Bearings Made to Order.
Send Sketch or Sample for Quotation.

Catalog Upon Request

THE G WILLIAM CO.

358 Furman St., Brooklyn, N. Y.

DIAMOND TOOLS FOR ECONOMY



All types for dressing grinding wheels. Shaped Diamond Tools, etc. Large stock unset stones on hand. Resetting and resharpenings returned same day received.

Send for price list and specify your requirements.

E. KARELSEN, INC.

Established 1852

15 West 44th St., New York, N. Y.

PISTON RINGS

Step Cut—Angle Cut—Butt End
From 1" to 16" diameter

Prompt service on large or small quantities, for Original Equipment and Maintenance.

(Special sizes to order)

The Auto-Diesel Piston Ring Co.

1430 East 32nd St., Cleveland, Ohio.

Columbia TOOL STEEL

Not offered with
catch-penny
phrases but hon-
estly represented
tool steel devel-
oped to highest
standards.

*It pays to use
Good Tool Steel.*

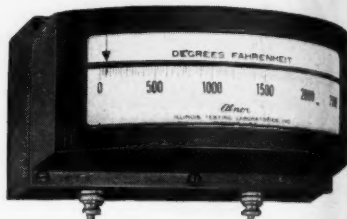
COLUMBIA TOOL STEEL COMPANY

MAIN OFFICE AND WORKS

600 E. 14TH STREET CHICAGO HEIGHTS ILLINOIS

avoids errors due to parallax permits accurate readings with ease. The indicator case is provided with a gasket of special structure which excludes moisture, fumes, or dust.

A manually-operated cold end adjusting screw is provided. When specified on order and when alloy connecting



"Alnor" Horizontal Edgewise Pyrometer

wire is used, an automatic internal cold end compensator can be furnished. Internal resistance is exceptionally high assuring freedom from errors caused by varying lengths of thermo-couple wires. The pyrometer is $7\frac{1}{4}$ inches wide, 10 inches high, and 7 inches deep. Net weight is 13 pounds.

Sheffield Visual Gage

Among the advances that have been made in production plants in the few years has been the change from selective assembly to precision inspection, which has been made practically through the development of the modern visual gage. Parts are gaged and classified according to exact size, the gaging being handled rapidly and economically by the use of visual gages similar to those shown in the illustration. Under such a system, no time is lost in the assembling departments. When the assembler picks up a part, he knows that it is the correct size for the fit required.

Obviously, however, such methods require precision measuring equipment with which readings may be taken instantly to tenths of a thousand of an inch and in many cases to fractions of tenths.

The No. 1 visual gage, a product of the Sheffield Gage Corporation, Dayton, Ohio, is both a rapid inspection gage for close tolerance production work and also a precision comparator by which other gages may be periodically checked. A relative movement of 0.000025 inches between the anvils covers a space of $\frac{1}{16}$ inch or one unit on the illuminating dial. A difference of 0.001 inch in



Rollway

**COOLANT PUMPS
LUBRICANT PUMPS**

Suited to every application for pumping coolants and lubricants. Advantages include automatic built-in relief valve, self priming, lower speed, longer life, greater capacity, high vacuum, and no clogging.

Write for bulletin and dimension sheet.

PIONEER

ENGINEERING & MANUFACTURING CO.
31 Melbourne, Detroit, Mich.

**WHAT SIZE DIAMONDS
for your
GRINDING WHEELS?**

Send for



*The Romance
of
Industrial
DIAMONDS*

Discusses the History, Characteristics, and Classifications of Diamonds. A table is given as guide for selecting the correct size stones for all your grinding wheels.

ANTON SMIT & COMPANY
SELMA MERCANTILE CORP.
SOLE U.S. REPRESENTATIVES
24 STATE ST., NEW YORK, N. Y.

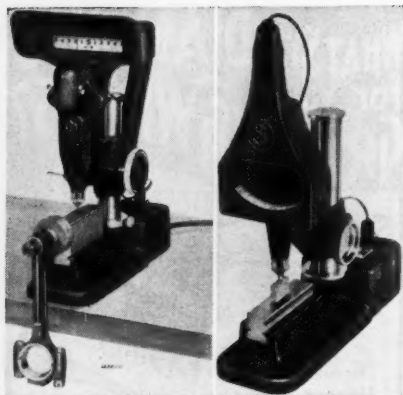


S P E E D
MILFORD REZISTOR
RED HARDNESS BLADES

Fastest in their field! Cut stainless steel or any tough, hard metal at a speed that burns out ordinary blades. Yet REZISTOR BLADES cost 30% less, power sizes, than tungsten high speed steel blades. Use modern equipment. Get the facts.



THE HENRY G. THOMPSON & SON CO.
277 Chapel St.
NEW HAVEN, CONN., U. S. A.



(Left)—No. 1 Visual Gage With Internal Attachment Checking Small End Of Connecting Rod To Tenths. (Right)—No. 3 Visual Gage Being Used To Check A Gage Block.

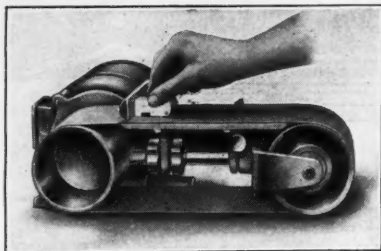
setting moves the indicator $\frac{1}{2}$ inch along its scale. This 4000 to 1 magnification results from ingeniously obtaining mechanical and optical magnification, which in the Sheffield gage is

accomplished without resorting to removable elements such as gears, pinion lever, or knife edges. No element in the assembly of the gage is subject to sliding friction. As a result, there is no opportunity for the gage to become inaccurate due to wear.

The upper gaging element is diamond tipped to minimize all effects of wear. The lower anvil is furnished in two interchangeable types, one flat for gaging of flat surfaces and outside cylindrical diameters; the other of a mandrel type, for gaging internal diameters. The flat anvil is made of Sheffield special steel. When the gage is to be used for high production inspection such as bearing rollers, piston pins, and so on, a strip of tungsten carbide $\frac{1}{2}$ inch wide is set into the flat surface of the anvil as an additional protection against wear. The mandrel for internal diameter gaging carries two strips of tungsten carbide properly spaced. A lower contact consisting of a spherical tungsten carbide point is set into the end of a lever which actuates the diamond-pointed upper gaging element. Thus all internal diameters are measured on a 3-point contact.

The visual gage can be used on 110-volt a.c. 60 cycle current. A transformer in the base of the gage

It's New HANDY SPEED FINISHER



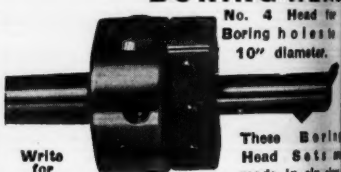
4" wide Abrasive Belt (other sizes up to 20" wide)

Saves a lot of time—filing, burring, straightening, etc. Very handy.

Write for Catalogue

PRODUCTION MACHINE CO.
GREENFIELD, MASS.

CRALEY OFF-SET BORING HEAD

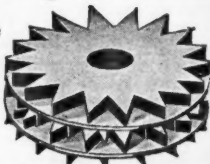


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Prices

C. C. CRALEY MFG. CO., SHILLINGTON, PA.

Grinding Wheel Dressers

We make
all types
of
Dressers
and
Cutters



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Catalogue
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DESMOND-STEPHAN MFG. CO.
URBANA, OHIO

PUTNAM HI-SPEED END MILLS



Putnam tools are designed and manufactured by engineers having many years experience in filling tooling requirements. Every Putnam Hi-Speed tool is a quality product.

Write for new catalog.

The Putnam Tool Co.

2981 CHARLEVOIX AVE.
DETROIT, MICH.

BRANCH OFFICES AND STOCKS:
Chicago, Muncie, Ft. Wayne.
REPRESENTATIVES: New York,
Philadelphia, Pittsburgh, Cleveland,
Dayton, South Bend.

WHAT ARE THE VARIOUS COATED ABRASIVES?

GARNET

By E. B. GALLAHER

Editor, Clover Business Service
Treasurer, Clover Mfg. Co.

IN OUR LAST AD we described Flint Sandpaper . . . today we tell you about Garnet.

● GARNET is a mined product. It is used in jewelry and in other ways, but its greatest service is had when it is crushed, graded, and applied to Coated Abrasives.

● All garnets are not alike . . . when crushed, they fracture differently: and some are much harder and sharper than others. The best garnet comes from mines in New York.

● The right kind of Garnet, when crushed and graded, is vastly sharper than Flint, and very much harder. It will, therefore, cut faster and cleaner, and will perform more work than Flint.

● Garnet Cabinet and Finishing Papers are generally employed by cabinet-makers, and especially for use on hard woods. You can get a better surface with Garnet than with anything else.

● Garnet costs more than Flint to buy, but its work value is so much greater that it actually costs less to use.

● GARNET, in addition to Finishing and Cabinet Papers, sold in 9x11" sheets, in grades from No. 7/0 to No. 3, is also sold in 50-yard Paper Rolls in widths from 4" to 24" and grits from No. 6/0 to No. 3. Garnet Cloth Rolls are also sold in grits from No. 4/0 to No. 3 and in widths from 4" to 28".

● The roll goods, both paper and cloth, are employed in machine operations, and are very generally used in shops everywhere.

● File these ads for reference.

NEXT ISSUE WE
WILL DESCRIBE
ALUMINOUS OX-
IDE AND ITS VAR-
IOUS USES.

CLOVER MFG. CO.

NORWALK,
CONN.

Also makers of the famous
Clover Grinding and Lapping
Compounds



\$1.00 will bring you this Automatic Stop . . . the most economical stop for blanking dies. SAVES 75% of your automatic stop cost. Can be fitted to any blanking die in 35 minutes. Conventional design . . . strong . . . simple. Send your order today.

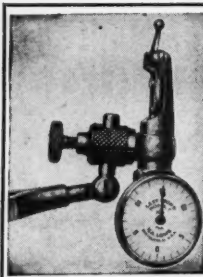
Automatic Stop \$1.00 each

Primary Stop \$0.30 each

(Discount 15% on dozen lots)

R. KRASBERG & SONS MFG. CO.

1621 N. LINCOLN ST. CHICAGO, ILL.

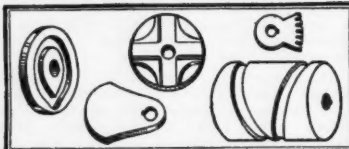


LAST WORD PRECISION GAGES

In your gaging work you demand indicators capable of close accuracy, wide adaptability, and long life. That's what you get in Last Word Indicators.

Write for Folder

H. A. LOWE CO.
1875 East 68th St.,
Cleveland, Ohio



ALL STYLES CAMS SIZES UP TO 50"
GENEVA MOTIONS
MADE TO CUSTOMER'S SPECIFICATIONS
KUX-LOHNER MACHINE CO.
2147 Lexington St. Chicago, Ill.

Made by SPECIALISTS . . .



Manufacturers everywhere specify American Hollow Bored Forgings because they are made by specialists . . . men who know real accuracy . . . and because the price is right.

It is good business to investigate American Hollow Bored Shafts and Forgings for your needs. Send us your blueprints. Data and prices will be furnished without obligation.

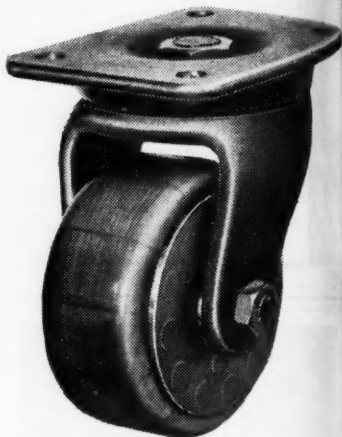
**AMERICAN
HOLLOW BORING CO.**

2000 Raspberry St.
Erie, Pennsylvania

down the voltage to 8 volts for illuminating the reading dial. The No. 3 view gage differs from the No. 1 in that it operates on a 1000 to 1 magnification. A relative movement of 0.0001 inch between the gaging elements registers a distance of $\frac{1}{8}$ inch on the illuminated dial; otherwise the instruments are the same.

"Standard" Truck Caster

The illustration shows a steel forged caster with a Metzger End-Wood wheel—product of the Metzger Company, Inc., Grand Rapids, Mich. The feature of this caster is that the king-pin is



"Standard" Truck Caster With Metzger End-Wood Wheel

lower ball race are made from a single forging, banishing any possibility of king-pin trouble.

The caster can be supplied with either forged steel wheels which will not break or chip, or with Metzger End-Wood wheels of selected and scientifically treated hard maple. Either wheel is guaranteed unbreakable. Wheel diameters are 4, 5 and 6 inches.

When the caster is supplied with steel forged wheels, either the Oilite bronze type bearing or the Hyatt roller bearing is used. The Oilite bearing is of cast bronze, has a high oil capacity and unusual strength. It has an extremely high load capacity. A leather and steel grease seal protects it from grit and dirt. The End-Wood lubricating bearing never requires attention.

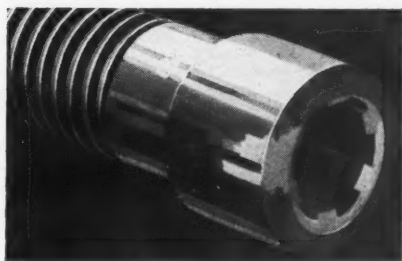


Standardized Die Sets, embodying many exclusive features, and a listing of more than 95,000 stock sizes, afford a service that is unsurpassed.

Send for Our New 208 Page Catalog

E. A. Baumbach Mfg. Co.

1806 S. Kilbourn Ave., Chicago, Ill.



TIGHTER

in tight places...

Thanks to the gear-like action of the fluted Bristo Wrench in the fluted Bristo socket, setting up a Bristo Screw is a positive operation. There is no slipping, fumbling or rounding out of socket. Nor any jamming. Bristos are tighter in cramped, hard-to-get-at places. The Bristol Company, Waterbury, Connecticut.



TRADE MARK

BRISTO

REG. U.S. PAT. OFF.

SOCKET HEAD SET AND CAP SCREWS

FEDERAL DIAL INDICATORS Built Like Chronometers and As Accurate



Lasting accuracy is as necessary to the efficiency of a Dial Indicator as it is to a chronometer—and it is based on the same structural features.

We insure it in Federal Dial Indicators by **JEWEL BEARINGS** (though plain bearings are optional); **DIE CAST CASE** of bronze alloy composition with stem cast integral and no soldered joints; **HOBBED GEARS** and **PINIONS**—by the especially accurate Federal process; **STAINLESS STEEL** gears, pinions, screws, racks—non-corrosive and tougher than brass; **INDIVIDUAL UNIT MOVEMENT** (as in watches) reduces time for cleaning more than one half; all exposed parts **CHROMIUM PLATED**.

Send for complete details.

FEDERAL PRODUCTS CORP.
1144 EDDY ST., PROVIDENCE, R. I.

Branches:

DETROIT CHICAGO
CLEVELAND MUNCIE NEW YORK

it is an integral part of the all-wedge wheel. The Hyatt bearing is of the same precision and quality as those used in automobile transmissions.

ForgeWeld Caster

A new truck caster that operates as easily under heavy load as moderate ones, called the ForgeWeld Caster, has been brought out by the Service Caster & Truck Company, 596 N. Albion St., Albion, Mich. The top plate, yoke base and button, or thrust bearing, are of

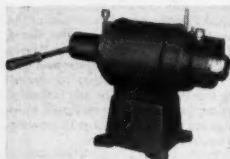
drop-forged steel. The yoke legs, extending down to the wheel, are cut from structural steel, and the units are assembled by arc-welding.

A double ball bearing swivel with



ForgeWeld Caster

IDEAL SPEED LATHES



**FOR LAPPING
FINISHING
POLISHING
SMALL PARTS**
2 Speed Motor.
Collet or 3 Jaw
Chucks. Hand
operated or automatic. Write
for Cir. 351.

SCHAUER MACHINE CO.

905-7 Broadway

Cincinnati, Ohio

EISLER SPOT WELDERS

$\frac{1}{2}$ to 100 K. V. A.
ELECTRIC SAW BRAZING
MACHINES, BUTT WIRE,
PORTABLE AND SPECIAL
WELDERS

Welders as low as \$35.00

Submit Samples for Test.

No Obligation.

Eisler Engineering Co.

742 S. 13th St., Newark, N. J.

Dealers Wanted.

Write Chas. Eisler, Pres.



hardened raceways, Hyatt roller bearing axle, and two Zerk fittings are standard equipment. The caster comes in four wheel sizes ranging from $3\frac{1}{4}$ inches up to 10 inches and those wheels can be either semi-steel, Textolite, or rubber tired.

Acme Steel-Mesh Conveyor Belt

Acme Steel Company, 2840 S. Archer Ave., Chicago, Ill., has made an improvement in the construction of its open mesh steel conveyor belt which is made

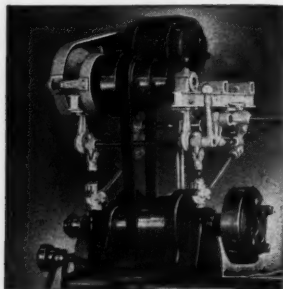
REMCO MOTOR DRIVES

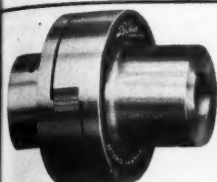
Complete rigidity—no overhang—no strain on beds, frames, etc. Universal motor mounting—use any motor—not built special, change from one tool to another if desired. V Belt or Chain from motor. Complete guards—quick belt adjustment. Complete line of Drives from Hack Saws to 42" Lathes, etc.—Quickly applied.

Complete Literature on Request

MANLEY PRODUCTS CORPORATION

YORK, PENNSYLVANIA





Patent No. 2,003,848, 6-4-35

Bond
 Flexible-Insulated
COUPLING
**ONLY
3
PARTS!**
 That Means
**TROUBLE-FREE
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CHARLES

Bond
 COMPANY
 Philadelphia, Pa.

**"NICHOLSON"
EXPANDING MANDRELS**


THEY act like a four jawed chuck, expanding in the bores of collars, bushings, gears, millers, etc., and holding them securely while being machined in a lathe, miller, shaper or grinder. For bores from $\frac{1}{2}$ " to 7".

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 136 Oregon Street Wilkes-Barre, Pa.

**SAVE That Old
GAUGE**

WE will make it as good as new. Service includes cleaning . . . new parts . . . replating . . . new dial . . . crystal . . . pointer and accuracy test, 48-hour factory service.

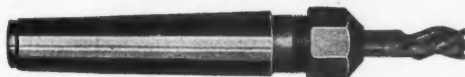

**WE
RENEW IT
FOR ONLY
\$2.50**
FOR ACCURACY Model No. 55 (other models in proportion) . . . Send your old Ames gauges now to Dept. M M.

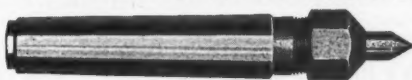
B. C. AMES COMPANY
 WALTHAM, MASS.

160

UNIVERSAL
**STANDARD
DRILL BUSHINGS**

**A. S. A.
Specifications**
**LONG
LIFE**
**LOW
COST**
**UNIVERSAL
ENGINEERING CO.**
 FRANKENMUTH, MICHIGAN

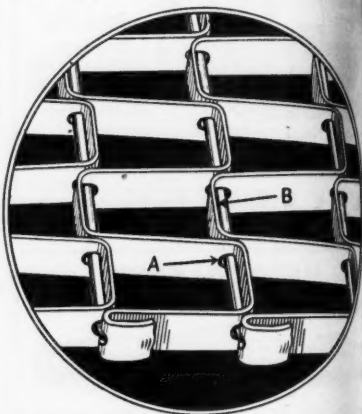
**COLLET CHUCKS
for End Mills**

KEYWAY CUTTERS

**AND
NITRIDED CENTER POINTS**


to be of importance from a service and maintenance standpoint.

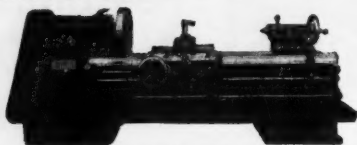
Acme belts are composed of formed spindles of flat steel, connected by pivot rods as shown in the illustration. Formerly the rods were inserted through round holes, the edge of the hole being the only bearing on the rod. To reduce the wear on the rods, the holes are now elongated to a point where the entire flat surface of the U-shaped section is utilized as a bearing, as shown. This simple change has materially increased the life of the belt and has also increased the flexibility and smoothness of operation.

Acme belts are especially adapted for conveying products through drying ovens, for sorting and assembling opera-



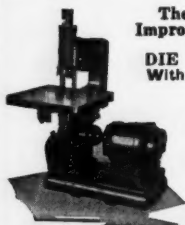
Section of Acme Steel-Mesh Conveyor Belt

LATHES . . .



- SINGLE LEVER CONTROL
- CONE HEAD AND GEARED HEAD
- 14" TO 30" SWING

GREAVES-KLUSMAN TOOL CO. Cincinnati, Ohio



The Improved OLIVER

DIE MAKING MACHINE
With Its Many New Features

Will enable you to reduce the cost of labor on your dies, gages, cams, templates, stripper plates, experimental work, etc. from 30% to 60%. Send for our bulletin. No obligation.

OLIVER INSTRUMENT CO.

1430 E. Maumee Street, Adrian, Michigan

tions, and similar applications. The open mesh allows for free circulation of air, heat, water, steam, or liquids, making it an ideal conveyor for handling products through washing, cooling, or drying operations. The parts are cold rolled strip steel, electro-galvanized to resist rust, or of Acme Stainless Steel.

Time Control Unit Exactly Adjustable To Job Requirements

The illustration shows the Series 1274-5-6 Time Controls now being offered by Automatic Temperature Control Co., Inc., 34 East Logan St., Philadelphia, Pa. These controls are designed to repeat one or two operations or processes as often as desired, provision being

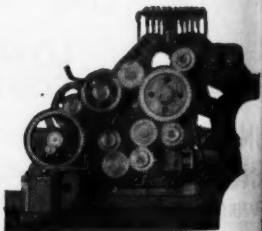
Increase Your Machine Efficiency with Automatic Lubrication

Blanchard Pulsator Automatic Oil Lubrication Provides:

- measured delivery of oil visible at each bearing when in motion.
- increased production time and lowered oil and labor costs.

Write for descriptive bulletin B-5

RIVETT LATHE & GRINDER, INC.
BRIGHTON BOSTON, MASS.





COLONIAL DRILL JIG BUSHINGS

A. S. A. STANDARD

You are sure of getting accurate and dependable drill jig bushings when you order COLONIAL. Made of High Grade Tool Steel. And when you order COLONIAL, you'll get them quickly.

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Sheets and Prices

**COLONIAL
BUSHINGS, Inc.**

16 JOS. CAMPAU ST.
DETROIT, MICH.



A New Keyseater

With Tilting
Table For
Either
Straight Or
Tapered
Bores

Send
For
Circular



Davis Keyseater Co.

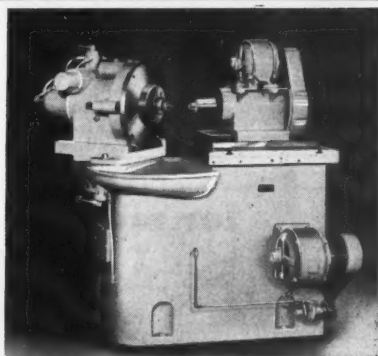
Exchange and Glasgow Sts.
Rochester, N. Y.

GEAR TOOTH BURRING

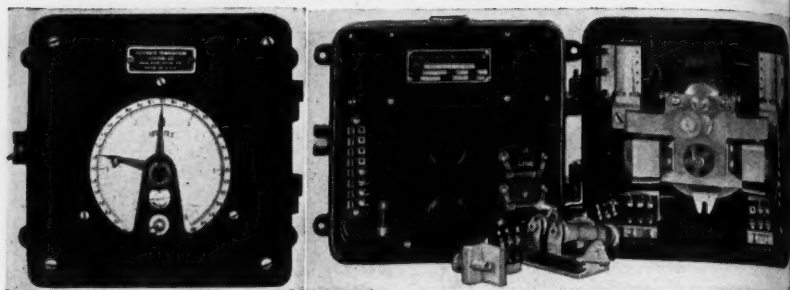
No. 40 CROSS Gear Tooth Pointing Machine advantageously used for gear tooth burring operations, thus eliminating slow and costly hand filing. It is free and clean cutting, hollow mill cutter produces a smooth even job of the utmost uniformity. This vast improvement in quality is accompanied by a phenomenal decrease in costs.

Although rapidly increasing in popularity as a burring machine, it is extensively used and generally recognized as the finest equipment obtainable for pointing both external and internal automotive synchronous gear teeth, for chamfering helical gears, starter gears, splines, spiral bevel gears and pinions.

A universal machine, free of cams, master indexing mechanism and all other mechanisms of a special nature. No. 40 CROSS may be easily and quickly changed over and set up to handle any type and size of gear within its rated capacity—no need for additional equipment because this machine is hydraulically controlled and operated, is equipped with a universal and accurate indexing mechanism.



CROSS GEAR & MACHINE CO. 3250 BELLEVUE, DETROIT, MICH.



Interior and Exterior of Series 1274 Time Control Unit

ing been made for exceedingly flexible choice of periods during which the controlled actions take place.

The time controls in this series will handle a repetitive action or operation requiring a definite time period or cycle with either the same or a different time period between successive time cycles. The time cycle and also the interval between successive cycles is infinitely adjustable with an accuracy of setting to within a split scale division of the respective dial ranges selected.

Parts have been so grouped on the

chassis that adjustment is simple. Junction connections permit removal of parts without disturbing the wiring; thus settings remain accurate despite vibration. The special contact-metal transmits current even when oxidized. The unit can be supplied for 110 V. A. C. or 220 V. A. C. if required.

Vibration Eliminator

The illustration shows a new shock absorber or cushion for machinery, called the "Vibration Eliminator", which has



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LINLEY NOISELESS ROTARY RIVETING MACHINES

Assure Peak Production and Lower Maintenance. Rigid and Powerful. Bench and Floor Types. Motor or Belt Driven. There is a Linley machine for every riveting job.

Send Samples of your Work and we will furnish accurate estimate of production and quote cost of equipment.

LINLEY BROTHERS CO.
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GEARS


Small and Medium Sizes

Quality Workmanship and Accuracy have retained most of our customers for 25 years.

Send sample or sketch of your requirements.

THE TAYLOR MACHINE CO.
CLEVELAND, OHIO

... for more than 1001 odd jobs



The Hjorth Bench Lathe has the speed, accuracy, handling ease and dependability that appeal to every operator. That's why you'll find the better shops equipping with the Hjorth Lathe.

Write today for data and prices.

HJORTH LATHE & TOOL CO., 12 Beacon St., Woburn, Mass.

July, 1935

Emery Wheel Dressers



CUTTERS

VARIOUS SIZES FOR
YOUR WHEELS

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GEO. H. CALDER CO.

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Write for quotation on
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QUALITY TOOL WORKS
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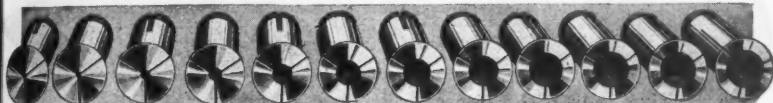
Special Cutters made to
Blue Prints.

QUALITY TOOL WORKS

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All lines of "Rivett Mark" Collets including Hendev, Cataract, Seneca and Rivett Styles can
now be purchased from the following stocks:

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R. E. Ellis Engineering Co.
621 Washington Blvd.

BOSTON
Rivett Lathe & Grinder Inc.
Brighton District

Write for Bulletin 100-A and Price List

DETROIT
Chas. A. Strelinger Co.
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THE SURE WAY TO
MAINTAIN PRECISION

JOHANSSON

GAGE BLOCKS AND ACCESSORIES

Available in sets or individually in three quali-
ties for working, inspection, or laboratory use.

At 68° Fahrenheit they have an accuracy of

Quality	Inch	Metric
"B"	±.000008	.0002
"A"	±.000004	.0001
"AA"	±.000002	.00005

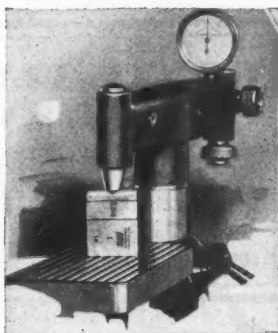
per block up to one inch (25.4 mm.) of length and per inch (25.4 mm.)
of length on longer blocks.

Write for Catalogue No. 11 showing reduced prices on "A" quality
Gage Blocks. *Manufactured and Serviced by*

FORD MOTOR COMPANY

JOHANSSON DIVISION

DEARBORN, MICHIGAN



Setting an amplifier gage with
Johansson Gage Blocks—the
most accurate, practical, and
economical gaging system
known.

been placed on the market by the Vibration Eliminator Company, 4126 37th St., Long Island City, N. Y. The vibration eliminator consists chiefly of a sheet metal base and supporting housing to which the leg or base of the machine may be rigidly fastened. The vibration eliminator relies for its efficiency chiefly upon a new table of selected loadings on pure natural cork which has for many years been considered by engineers one of the foremost isolating materials. Adequate loadings and ease of installation are features of this eliminator.

The eliminator is made in three sizes:



"Alnor"

PYROMETERS

For the Hardening
Furnace

Price complete with-
out protec-
tion tube. **\$13 to
\$36.00
and up**

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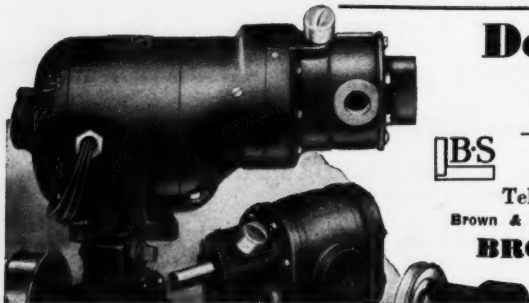
ILLINOIS TESTING LABORATORIES, Inc.
146 W. Austin Ave. CHICAGO, ILL.

CENTERLESS GRINDING

Accuracy — Prompt Service

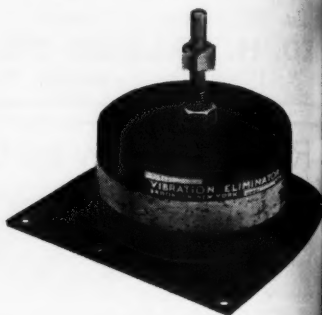
COMMERCIAL CENTERLESS GRINDING CO.

6538 CARNEGIE AVE., CLEVELAND



the No. 22, 3x3x2 in. in height, supplied in all loadings between 65 and 100 pounds each; the No. 23, 4½x4½x2 in. in height, supplied in all loadings between 100 and 200 pounds each; and No. 24, 5½x5½x2 in. in height, supplied in all loadings between 175 and 375 pounds each.

Six of the No. 24 eliminators



Vibration Eliminator

efficiently isolate up to 2250 pounds. They are easy to install; one is placed under each leg or supporting point of the machine base. The machine is bolted to the vibration eliminator and the eliminator is bolted to the floor.

The device is said to be durable and sturdy and it is plain that the isolating material, which is natural cork, will maintain its efficiency during the entire life of any machine. In addition, it is not effected by water, oils or temperature changes. The manufacturer claims that the isolating material will not become a permanent set under excessive loading, will not further compress after initial compression, and has a long period in its return after compression which prevents any bouncing action.

Dependable Pumps

—in a variety of
types and sizes

Tell Us Your Pump Needs

Brown & Sharpe Mfg. Co., Providence, R. I.

BROWN & SHARPE PUMPS



PYRO RADIATION PYROMETER



STOP spoilage. Get exact temperature of work in furnace. Direct reading; no calculations; no maintenance expense. Strictly automatic.

Range 1000 - 3600° F.

Special bulletins on request.

THE PYROMETER INSTRUMENT CO.
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FLYNN MICROMETER

OFFSET BORING HEADS

Made in Various Sizes and Styles

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WATERSTON'S 30 E. Larned St.
Detroit, Michigan

Ohio Gears

STOCK GEARS	SPLINED SHAFTS
SPECIAL GEARS	SPROCKETS

Write for Gear Catalog and quotation on your requirements.

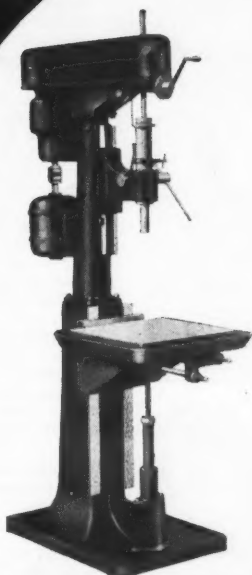
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1887 E. 179th St., Cleveland, Ohio

Washers

Accurate, flat, concentric washers, any material, any thickness. Made to order. 2000 die sizes now in stock. Washer list No. 32 Sent Free

DETROIT STAMPING CO
1449 W. Fort St. Detroit, Mich.

FOSDICK



SENSITIVE ECONOMAX

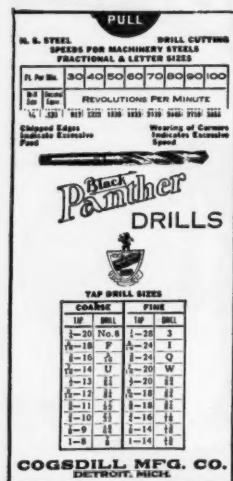
Ideal for fast, accurate drilling. Speed-box on vertical back shaft is equipped with hardened alloy-steel gears and anti-friction bearings running in lubricant. No belt-shifting mechanism. Gear change lever is located directly in front of operator. Six spindle speeds. Capacity from 1/2" to 1 1/2".

Write for Bulletin MS3

THE
FOSDICK
MACHINE TOOL CO.
CINCINNATI, OHIO

Cogsdill Speed and Feed Chart

The illustration shows a vest pocket drill feed and speed chart which is being distributed by the Cogsdill Mfg. Co.,



feet per minute. The chart also carries a table of tap drill sizes for coarse and fine thread taps.

A chart will be sent free to any machine shop executive upon request.

APEX PRODUCTION TOOLS: A catalog showing and describing the complete Apex line of tools for the metal working plant has been issued by The Apex Machine Tool Co., Third and Madison Sts., Dayton, Ohio. The tools listed are production tools of the highest caliber, designed after a considerable amount of research as to the particular needs of the production plants. This catalog—the No. 8—is available to any mechanical executive, production engineer, or other tool buyer, upon request.

STAMPINGS...

Small and medium from all sheet metals. Drawing to 5½ in. depth. Send samples or blue prints. High-grade work at interesting prices.

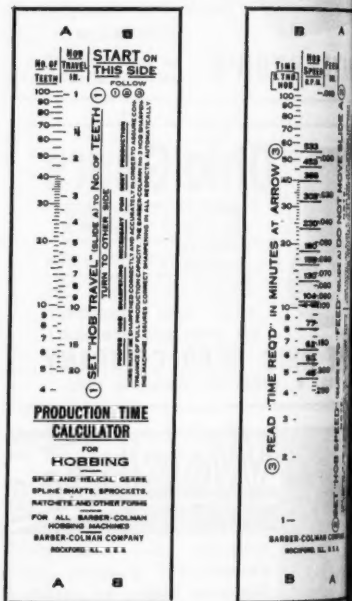
W. E. KAUTENBERG CO.
FREEPORT, ILL.

Inc., 6511 Epworth Blvd., Detroit, Michigan. The face of the chart carries a table of feet per minute, and the slide lists the sizes of the drills from the smallest to the largest used in ordinary work. When the slide is pulled out to a given drill size, the chart shows the size of the drill in decimals of an inch and gives the number of revolutions per minute required to obtain any peripheral speed from 30 to 100

"LENOX" LIST No. 35: This book put out by the American Saw & Co., Springfield, Mass., contains specifications, descriptions, and illustrations of the hack saw blades, metal-cutting band saws, and other tools made by the firm. In addition, it contains some useful information as to the manner in which work-pieces of various shapes should be held in order to obtain the quickest and most accurate results in sawing, and includes a table giving the number of teeth per inch that a hack saw blade should have in order to do the best job of cutting. Copy free.

"B-C" Production Time Calculator

The illustration shows the obverse and reverse sides of a "Production Time Calculator" for quickly figuring the production time on hobbing jobs, now being distributed to supervisors and executives of gear cutting departments by Barber-Colman Company, Rockford,



The calculator is, in effect, a special slide-rule with which, by setting the slides according to the number of teeth and feed, the number of minutes required for hobbing any job can instantly be determined. The calculator is

"OUTWEARS

the best

Bronze Metal"

20 years



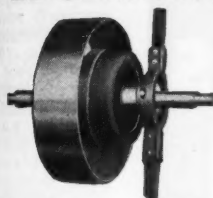
without
a drink -

ARGUTO OILLESS BEARING CO.

Wayne Junction, Philadelphia, Pa.

"EDGEMONT" SERVICE TESTED FRICTION CLUTCHES

Expanding "Type B"



Line Shaft Clutch Pulley

For general factory use and all Friction Clutch applications where a dependable clutch is needed, at minimum cost, the Expanding "Type B" has no equal.

Write now about that clutch job, we have a type to suit any service.

The Edgemont Machine Co.

2100 HOME AVE., DAYTON, OHIO

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for

Roller, Block and Silent Chains

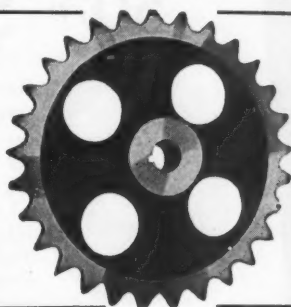
OVER 45,000 IN STOCK

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Cullman Wheel Company

1336 ALTGELD ST.

CHICAGO



"Gledhill"

Combined Drills and Countersinks for Greater Production

"GLEDHILL" COMBINED DRILLS AND COUNTERSINKS are designed and tempered correctly to give long and uninterrupted service. Thin web at point, thickening at countersink with flutes milled to allow free elimination of chips. SPECIFY "GLEDHILL" when ordering.

CIRCULAR TOOL COMPANY, Inc. PROVIDENCE, R. I.
767 ALLENS AVE.

light though substantial construction, and can easily be carried in the vest pocket. The calculator can be used to determine the time required for hobbing spur gears, helical gears, spline shafts, sprockets, ratchets, and other forms produced by the hobbing process.

A calculator will be sent to any gear hobbing department executive who will request it on his firm letterhead.

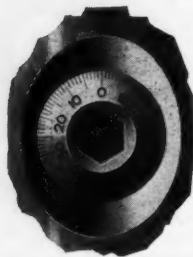
SHELDON BULLETIN No. 23, issued by Sheldon Machine Co., 3255 Cottage Grove Ave., Chicago, Ill., contains a

complete description of the Sheldon 11 inch lathe and accessories. The accessories include a taper attachment, draw in collet attachment, collets, four-jaw chuck, three-jaw chuck, drill chuck, milling and keyway-cutting attachments and adapters for automotive repair work on pistons.

In addition to the description and illustration of the lathe, the bulletin gives specifications for the attachments and includes prices. Copies free to mechanical executives.

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As high as . . .
50% Saving



Davis Boring Tools are simple in design, rugged in construction, easy to operate. As high as 50% saving in boring time is effected with some of our specially designed tools. With Davis "L" Type Boring Bars, efficient operation is assured by the quick, accurate Micrometer Adjustment for expanding the cutters to size. Davis Tools are ideal for all rough, semi-finish or finish boring operations.

Write for Bulletin No. 102

Davis Boring Tool Company, Inc.

Division: Larkin Packer Co.

6200 Maple Ave.

St. Louis, Mo.

LANDIS TOOL AND CUTTING GRINDER CATALOG No. 100

This catalog not only contains a complete and detailed description of the 12 inch Landis Tool and Cutter Grinding Machine and the machine parts, but it also includes pictures and description of a wide variety of set-ups for sharpening all kinds and types of milling cutters, slitting saws, face mill, inserted tool cutters, gear cutters, slab mill cutters, form cutters, and others. Separate sections are devoted to circular form tool grinding equipment and spiral generating grinding methods and equipment. A plant executive can obtain a copy by addressing the Landis Tool Company, Wayneboro, Pa.

Your copy of MODERN MACHINE SHOP—your guide to the Machine Tool Show—will be mailed Aug. 24.

Volume

A Magazine for Mechanical Executives, Constructors, Product Engineers, Maintenance

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